Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

APRIL 1953

R OFFICERS AND SUPERVISORS RESPONSIBLE FOR DESIGN, CONSTRUCTION AND MAINTENANCE OF MOTIVE POWER AND ROLLING STOCK

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RAILWAY LOCOMOTIVES AND CARS

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What Do You Read?

Like all magazines published on a self-supporting basis, *Railway Locomotives and Cars* is made up of so-called reader pages and advertising pages. It is the responsibility of the editorial staff to see that you—the subscriber—get the kind of material you want and can use to help you in your job. Each advertiser tells his own story about his product or service, with the ultimate purpose, of course, of increasing his sales.

What do you read? Do you confine your use of the magazine to the reader pages? Or do you make use of the advertising pages, too? Either you are buying the paper or it is being bought for you. In either case the purchaser considers it a useful product or he would not buy it. And presumably it is the editorial content which he has in mind when he pays his money.

But the value of the magazine is by no means confined to the reader pages. All of the products dealt with in the advertising pages are already in actual use somewhere in railroad shops, on locomotives, passenger cars, or freight cars, or will be soon if the advertiser is correct in his judgment as to the value of a new product to the prospective user.

Here are the kinds of products and services set forth in the advertising pages of an issue of *Railway Locomotives and Cars:* Diesel locomotive appliances and parts, including numerous electrical materials needed for their maintenance; freight and passenger car parts, including trucks, couplers, wheels, car-lighting equipment, floors, lubricants and lubricating devices, and a great variety of shop tools and equipment. The latter include machine tools, cutting tools, portable and small tools, furnaces, presses, and welding equipment. Information on several cleaning materials and methods will also be found in these pages.

No supervisor with responsibility for the operation of any department of a locomotive or car repair shop or for the performance of motive power and rolling stock in service can afford not to look at these pages. It is true that not all of the pages give the kind of information you would like to have, but many of them are full of fact and helpful suggestion which will aid you in finding the solution to some of your problems. If you are not yet a supervisor but hope to be, let your curiosity lead you through all of the pages in the book. On the testimony of readers we have received from time to time we find the advertising pages account for no mean part of the value of the magazine to you.

C. B. Peck

Meehanite iron-jack journal bearing prepared for babbitting by the Kolene process.

A standard bronze journal bearing tested in comparison with the iron-back bearing.

What Causes Car Journals To Burn Off?

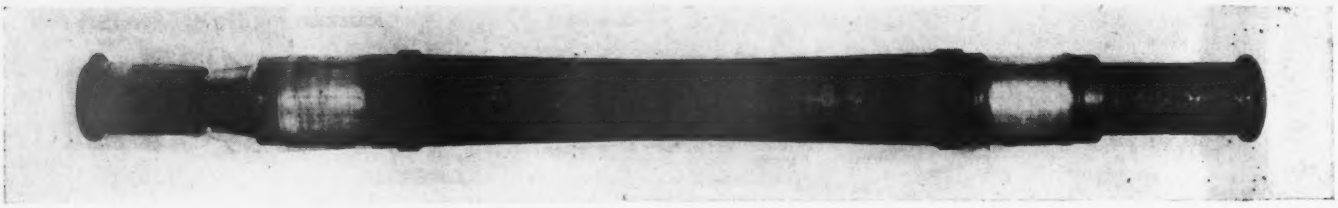
Lackawanna research points strongly to copper penetration. Iron-back bearing now alternate A. A. R. standard.

BY J. J. LAUDIG*

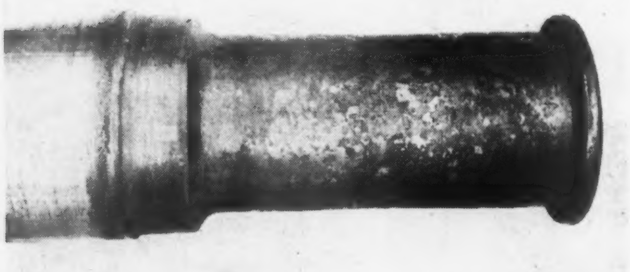
Railroad research engineers have always given to the hazard of burned-off car journals an important place among the railroading problems most urgently in need of solution. The A.A.R. has a standing committee studying that problem, and the seriousness of the hazard and extent of resultant damage are a matter of report in the records of the Interstate Commerce Commission.

Over a long period, numerous measures have been devised in the hope of eliminating accidents due to burned-off journals. The measures have been largely ineffectual because of the mistaken but quite natural assumption that the direct cause of burned-off journals was the intense

* Research engineer Delaware, Lackawanna & Western Railroad Company.



The journal after operating under iron-back bearings for 7 hr.and 105 miles without lubrication.



The axle after the test to destruction without lubrication. Left: journal burned off under bronze bearing after 42 miles. Right: journal intact under iron-back bearing after destruction of two bearings in 105 miles.

heat accumulating within the journal box when, for any reason, lubrication is inadequate or destroyed and metal to metal friction results.

However, long research at the Lackawanna laboratory to determine the actual cause of burned-off journals indicated that the cause was to be found in some factor other than the heat itself. In our pursuit of a possible different cause, a large number of journals at progressive stages of damage were made the subject of research. Studies and comparisons were made of journals that had only been heated, of journals that had been heated and cut, and of journals that had been heated, cut and burned-off.

But no matter what the progressive stage of damage, study and comparison of the points of failure of the journals revealed a similarity of pattern. The burn-off was found usually to be square, with little reduction at the point of failure, generally occurring about two-thirds of the distance from collar to fillet. The point of failure was found to be not the point of greatest stress, but the point of highest temperature and load concentration.

Additional information pointing to a possibly different cause of burning-off was gathered from trainmen and carmen. Their observations revealed marked differences in time between the detection of hot boxes and burning-off of journals, and they revealed, also, marked differences in the temperatures at which the various breaks occurred. These reported inconsistencies of behavior under what seemed to be similar conditions were significant signposts to the ultimate conclusion that the burn-offs were not caused directly by heat.

In physical, chemical and microscopic examinations of the damaged and burned-off journals to determine the kind and extent of change from new steel journal condition, we found, in general, the following:

The usual tensile test of the steel journal midway center to surface revealed reduced tensile strength, lower yield point ratio, and increased ductility in the steel below the surface. However, at the surface the metal was

PHYSICAL PROPERTIES OF BRONZE AND HIGH-TEST IRON FOR JOURNAL BEARINGS

	Bronze	High-test iron
Elastic limit, lb. per sq. in.	15,100	36,120
Tensile strength, lb. per sq. in.	23,650	45,150
Compressive strength, lb. per sq. in.	47,000	160,000
Brinell hardness	45	196
Specific gravity	9.0	7.28
Galling, lb.	2,000	2,750
Bearings (6 in. by 11 in.), lb.	37¾	31¾

weak, with little or no ductility. Metal chips at the surface were short and brittle, gradually showing more ductility as distance from surface increased. This condition at surface and directly below could easily be seen by turnings.

Also at standard location, i.e., midway center to surface, our chemical analyses of the steel showed no variation from accepted specifications. But at the surface location and increments below the surface, our analyses showed a *notable amount of copper*, the amount of copper decreasing with distance from the surface.

Then we took acid etchings of cross-sections back of the point of failure. These also showed, for the most part, sound steel structure below the surface, but at the surface we found cracks and *presence of copper*.

Finally, microscopic examination of the surface metal and the area directly below showed *copper between the grains*, this intercrystalline copper penetration varying in depth below the surface of the burned-off journals and cut journals, especially in area where failure occurs.

These cumulative observations and comparisons all seemed to point away from the long-held belief as to the cause of journal failures. The appearance of copper penetrating where copper had no right to be, hinted at the true reason for journal failures and for the peculiar embrittled appearance of the broken journals. A common point of failure of the journals being examined was not the point of greatest stress but the point of highest temperature and load concentration.

We began to realize what happens in the journal when a hot-box occurs. When extreme heat develops, the babbitt lining of the bronze back or shell melts and squeezes out, allowing the bronze shell of the bearing to come in contact with the steel journal rotating under and in contact with the bearing. Frictional heat, bending stresses and contact between the steel and bronze, bring about migration of copper from the bronze shell onto the steel journal. The copper then penetrates the steel journal at the surface along the grain boundaries of the steel. From the surface inward, then, the steel granulates and becomes weakened. In some cases under these conditions the journals break off, although in other cases the hot-box is discovered before the copper has penetrated far enough

to cause an immediate break. In the latter event the detection of a hot-box avoids the danger of burn-off if the car is set out of the train. But if it is continued in service, the journal, being permanently weakened, subsequently breaks or fails by the progression of the fracture now inherent in the journal, and detection in such a case has only delayed but not prevented a journal failure.

With this discovery of the migration of copper from the bronze shell and its intercrystalline penetration through the surface of the steel journal, it was then possible to reproduce these conditions in the laboratory on small scale tests and to produce similar failures. This copper penetration was further demonstrated by the simple experiment of heating a 3/8-in. steel rod and, while it was being bent or held under stress, rubbing on the bent surface a small section of bronze bearing back, or any copper base metal. An immediate brittle break confirmed the belief to which our research had led us, that burned-off journals were caused not by lubrication failure and consequent frictional heat but by the weakening caused by penetration of copper into the grain boundaries of the steel journal.

There still remained the task of preventing copper penetration into the steel journal. A study was made of readily available journal shell or back materials that would contain no copper. Not just any cast metal could be used for a bearing. It had to be a metal of superior physical properties and capable of making a better bond with the lining metal than yet known. Our experiments proved that common gray iron, for example, could not stand up under the hammering blows that railroad journal bearings must take in use. The bearing had to withstand punishing impact stresses without weakening. Further experiments showed that the desired results could be achieved with the use of a high-strength pearlitic cast iron. While there are several high-strength cast irons which might be employed and are satisfactory, we chose Meehanite B as most suited to our use. Meehanite is a pearlitic cast iron with a structure identifiable as such, and it has been well known practice to produce Meehanite castings having a strength much higher than the strength of bronze.

With the task of finding a suitable metal for the back was combined the search for a stronger lining-to-back bond than had theretofore been used for railroad journal bearings. In a railroad journal bearing it is vital to secure the most tenacious bond between babbitt lining and shell and one which will retain its bond at normal operating temperatures at full load and high speed. In a journal box the heat generated by the rotation of the axle under the bearing will build up in the journal unless it can be dissipated from the axle through the lining directly to and through the bearing shell or carried away by the circulated lubricating oil. A poor bond will prevent normal dissipation of frictional heat and will allow oil to get between babbitt lining and the back and further reduce this transfer or dissipation of frictional heat.

In our search for the best possible bond, we tried and had to discard as unsatisfactory, all the older suggested methods of attaching a babbitt lining to a shell or back. Cast iron was a difficult metal to bond as we surely can testify. In addition, we were searching for a uniform bond and for a stronger bond at operating temperatures.

The final surface preparation method adopted was the Kolene Process, which proved to be ideally suited for

The second iron-back bearing, applied to the red-hot journal, after 47 miles without lubrication.

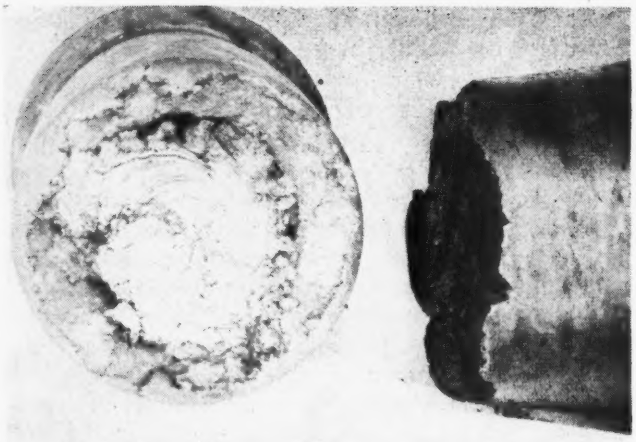
The journal box which held the iron-back bearing. A portion of the bearing is impressed in the wedge.

forming a tight bond. In this connection, the important factor in Meehanite is that its strength directly involves the physical constitution of the metal. In the pearlitic cast iron the metal is deoxidized and graphited so that the graphitic particles have a characteristic distribution known and identifiable. Graphitic particles are uniformly distributed throughout the casting and those particles exposed at, but embedded in the surface of the casting, can be removed when the casting is so treated.

Briefly stated, the Kolene Process consists in subjecting the casting to an electrolytic bath of alkaline salts, thus oxidizing the carbon particles at the surface which form carbon dioxide. The casting is then subjected to a reducing action which removes any oxides present. There remains, then, a surface free of exposed carbon particles. All the free and embedded carbon having been removed by the treatment, when the casting is tinned and babbitted (in a known manner) there is secured both an intimate chemical bond of tinning mixture to cleaned iron and a mechanical bond of babbitt in the graphite-free cavities. This gives a doubly secure bond of the utmost tenacity.

We were eventually ready to test in actual service the result of our research and experiments. On May 29,

The A.A.R. bronze bearing wedge and failed journal after a 42-mile run without lubrication.



Character of the journal fracture under the bronze bearing after completion of the test.

1945, standard sized bearings made of Meehanite B high-strength cast iron, lined with babbitt metal bonded to the shell, were installed in the tender of a DL&W yard engine at Kingston, Pa. Those bearings remained in service on the yard engine for 21 months, and when removed and studied they were found to be in excellent condition, with only moderate end wear.

While that test was running satisfactorily, a more rigorous road test was projected—a "test to destruction" of the iron-back bearing* under actual operating conditions. For that purpose the DL&W reserved a section of track between Scranton and Pocono Summit, Pa. In preparation, we placed a safety iron-back bearing at one end of an axle under a hopper car loaded with 140,000 lb. of coal, having removed all lubrication from that journal box. At the other end of the same axle we placed a conventional bronze back bearing with the usual lubrication in the journal box. We intended, by inducing a hot box around the iron-back bearing, to prove that a burn-off of the journal would not result from a hot box carrying a bearing made according to the research.

We started up the mountain in the early morning of August 26, 1946, the test car as part of a special train complete with wreck derrick, crew and full adjuncts. We made numerous stops for inspection and to record our observations. Of course, the expected—and desired—hot box developed around the iron-back bearing, and the bearing was progressively demolished by friction of the steel journal against it. At the end of 45 miles the red hot journal under the iron-back bearing had worn well into the bearing and even impressed into the wedge above it. The friction between the journal and bearing wore the bearing in two but the journal remained intact although red hot. We proceeded with the heated journal thrusting through the broken bearing to the end of our route, a total of 63 miles.

For the return trip from Pocono Summit, another iron-back bearing was installed in place of the demolished bearing, *over the same hot journal*, this time also without lubrication in the journal box to establish our theory beyond any shadow of doubt. Lubrication was then removed from the journal box containing the standard bronze back bearing at the other end of the same axle. Thus a second hot box was set up and soon developed, one at each end of the same axle. At the end of 42 miles of the return trip, the journal under the standard bronze back bearing failed by the typical "burn-off." So we had at this point, at one end of the axle a broken journal under a bronze back bearing after 42 miles without lubrication, and at the other end of the axle, a red hot journal still intact after 105 miles under the safety iron-back bearing without lubrication. The entire truck at this end of the car was then replaced by a new truck by use of the wreck derrick which was part of the test train, and the return run to Scranton was then completed.

At Scranton in our laboratory, both journals were examined. As our research and tests had led us to expect, the broken journal from under the bronze back shell disclosed copper penetration of the surface of the steel at the grain boundaries, with the typical embrittlement, weakening, and failure of the journal after 42 miles under hot box conditions. The journal under the safety iron-back bearing, after 105 miles, showed under examination only that it had been heated but that it could have carried the train an indefinite distance further. Etching and examination of a longitudinal cross-section of this latter journal disclosed that at the point of greater heating the steel had not been materially impaired.

Moving pictures were taken of this road test and later, photographs were made of the sectioned and etched journals in the laboratory at Scranton.

Because of the results of this road test, a number of other tests were made on the Lackawanna under express cars, mail cars, soda ash hopper cars and tenders of pas-

*This bearing, developed on the Lackawanna under Mr. Laudig's direction, is known as the Laudig Bearing.

senger engines—a variety of load and running conditions, and the iron-back bearing continued to prove entirely satisfactory in service.

We now felt confident that we had found the answer to one of railroading's most harassing problems, and we brought the safety iron-back bearing to the attention of the Mechanical Division of the A.A.R. They referred it to the Committee on Journal Bearing Development, which authorized tests which were made at the Association Laboratory at Indianapolis, Indiana, in July 1949. These tests, including the 65 hr. hot-cold continuous test, equivalent to 3,250 miles at test room temperature starting at 100 deg. F and decreasing to 20 deg. F below zero, showed satisfactory test performance.

On November 18, 1949, the A.A.R. Lubrication Committee recommended the test of 100 car sets of the iron-back bearings in railroad interchange. The General Committee of the A.A.R. approved this recommendation. Six railroads applied for the bearings for test: Pennsylvania, New York Central, Norfolk and Western, Baltimore and Ohio, Denver and Rio Grande, and the Lackawanna.

The 600 bearings for interchange test were made by the Cleveland Graphite Bronze Company whose chief engineer recognized the value of the new bearing and had his engineering and development staff produce the first commercially made safety iron-back bearings.

The bearings for interchange railroad test were applied by the six railroads to all variety of cars, those undergoing repairs and new cars. These tests have been underway since the fall of 1950. Some bearings have been removed for end wear and broken lugs but there have been no reported removals for spread linings. Although some bearings have been involved in serious hot boxes, there have been no burned-off journals, which has verified the need for this bearing and has positively rewarded research and development.

All of these service tests to-date were reviewed by the A.A.R. Lubrication Committee at its meeting on February 13, 1952, and that Committee recommended to the General Committee that the safety iron-back bearing be given A.A.R. approval as an A.A.R. alternate standard railroad journal bearing. The Association at its annual meeting on July 28, 1952, approved the recommendation of the Lubrication Committee, and action was confirmed by letter ballot of all railroads

All tests have shown that the safety iron-back bearing overcomes the real cause of burned-off journals—the penetration of copper into the steel journal at the grain boundaries. Tests have also shown the iron-back bearing to have additional advantages, among which are:

1. Its high strength flat back, permitting more uniform distribution of the load of the car over the length of the journal and resulting in reduction of bearing temperature.

2. Its high strength and rigidity, resulting in great reduction in spread linings.

3. The method of bonding the babbitt to the back or shell, whereby the bond is not reduced or lost at operating temperatures prevailing under heavy loads and summer heat; loosening of the lining is eliminated.

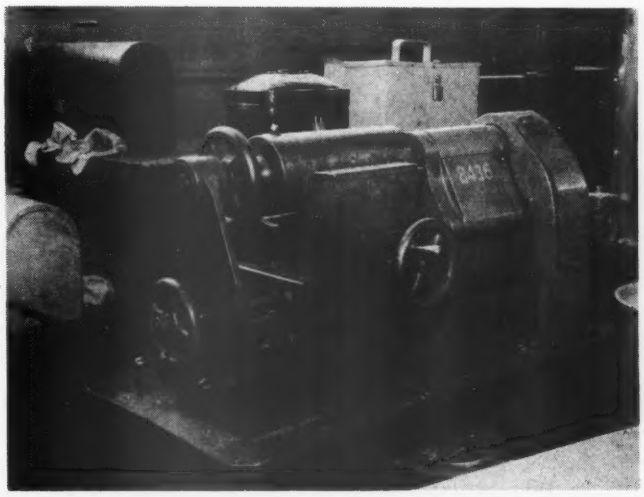
Thus, in the safety iron-back bearing is provided car journal bearing that can be largely of non-strategic materials, eliminating the crisis-inducing factor of burned-off journals. It is of standard A.A.R. dimensions and completely interchangeable with the present standard bearing.

Boring Support Bearing Oil Relief

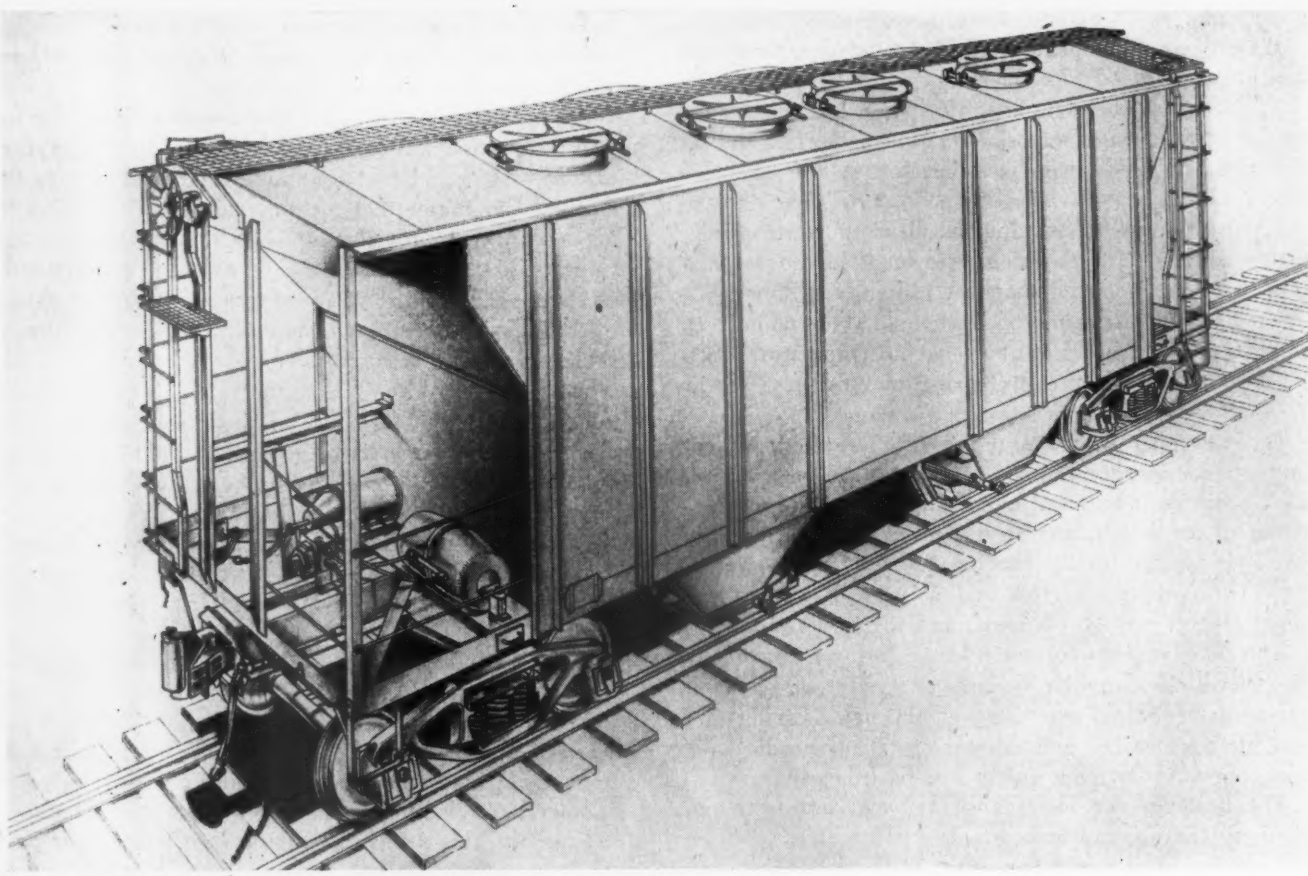
The Louisville & Nashville has developed a small machine to bore the oil relief area in each end of traction motor support bearings. Used at the South Louisville shops, the machine bores the relief areas on both ends in about three minutes, including set-up time. The finished job is of substantially higher quality than was attained by the previous method of scraping the relief by hand which took 30 minutes.

The bearing half is merely slipped under the spindle and the hand wheel shown on the right in the illustration is turned clockwise. This clamps the bearing half in place against the two sloping jaws of the holder, one of which is visible in the picture and the other identical to it on the other side. A lip extending over each side of the top of the vise jaws forces the outer surfaces of the bearing against the sloping sides of the holder and aligns the bearing half automatically in all three planes.

One cutting tool is mounted near each end of the power driven spindle for boring the two ends. The power feed has automatic stops to limit the travel to the required distance of the relief bore.



Machine for aligning and boring traction motor support bearing relief areas



PS-2 Covered Hopper Car with 50-Deg. Slope Sheets

Can Be Built In Three Lengths

Pullman-Standard car designed after survey to determine details wanted by railroads, shippers and consignees. Interior smooth. Circular loading hatches facilitate roof cleaning.

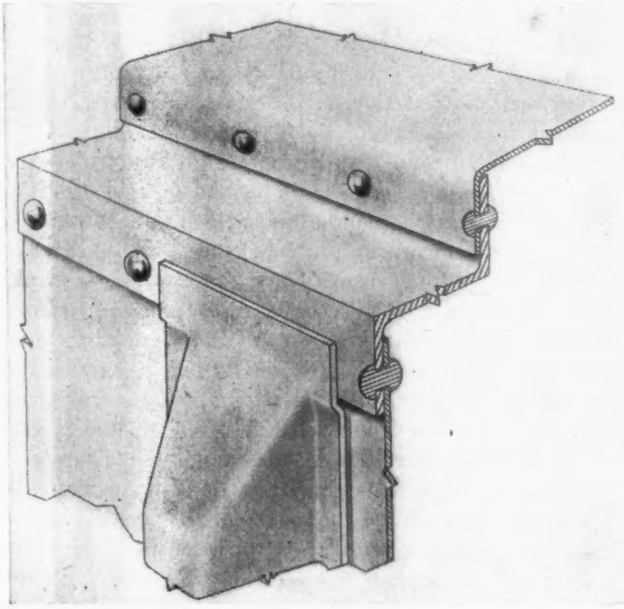
THE Pullman-Standard Car Manufacturing Company has built a new 70-ton all-welded covered hopper car which has a light weight of 46,400 lb. and cubic capacity of 2,003 cu. ft.; is designed for extensive automatic arc welding; has improved side-top corners, stronger roof, circular loading hatches and no obstructions on the 50-deg. slope sheets, shown by experience to be self clearing for most commodities handled in bulk such as cement, lime and soda ash.

The new car is essentially a refinement in design of covered hopper cars which this company has been designing and building in quantities since 1940, the production of 192 cars in that year being increased to 1,542 cars in 1952 and 3,092 cars on order the first of January, 1953. Rapidly increasing interest in covered hopper cars is indicated by a Pullman-Standard survey made to determine details which railroads, shippers and consignees consider most desirable in this type of car. The survey showed that, in addition to the three commodities mentioned, many other materials such as carbon black, crushed stone, grains, bauxite, sand, phosphate, dolomite, soap flakes and salt are frequently transported in bulk and shippers would like to have existing small covered hopper cars modified for handling four commodities in addition: namely, calcium carbide, wheat flour, oat flour and sugar.

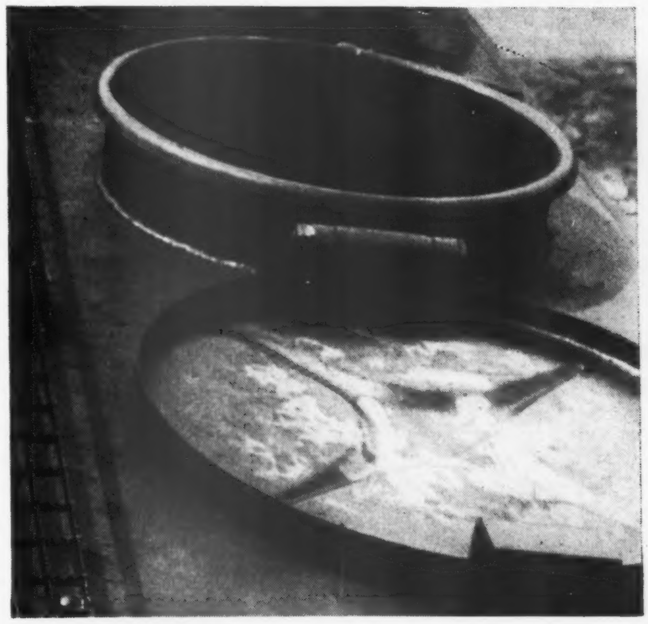
Improved Features

The car is all welded, the inside being smooth without any projecting rivet heads and with few overlapping ledge joints. This feature assures ease in unloading the car and greatly facilitates subsequent cleaning by virtue of the absence of rivet heads or ledges where materials can accumulate.

In developing details of the welded construction, a smooth and clean design was produced which assures



New overhanging bulb-angle side plate (top) simplifies roof cleaning and protects car sides. Conventional side-angle construction is shown below.



An open-hatch cover.

The circular hatch cover is held securely in place by center-pressure locking device. Roof is relatively unobstructed and easily cleaned.

good painting conditions and much improved under car access for men to operate the unloading gates and maintain air brakes and trucks.

The roof design was given special attention because this is one part in which all loading men are interested. The side-top chord of the car is a bulb angle without any offset at the top corner of the car, a construction which promotes easy and safe roof cleaning.

The loading hatches are circular, with 30 in. diameter openings instead of the conventional 36-in. by 36-in. and 30-in. by 30-in. hatches. The circular hatch leaves much extra room at the running board and thus assures greater safety for men standing on the roof when loading. Every attention has been given to locating running board supports and hatches to make the area between the hatches under the running boards readily and easily accessible for cleaning. The circular hatch covers have center-pressure locking in combination with flared hatch coamings to make an immediate and lasting seal.

The thicknesses of various structural members have been increased to remedy unsatisfactory conditions observed in the field and meet the demands of some shippers. Center sills are 51.2 lb. A.A.R. Z-bar section; roof carlines are 5-in. by 3-in. by $\frac{5}{16}$-in. angles; all roof sheets are $\frac{3}{16}$ in. thick; floor sheets, hoods and inside hopper sheets are $\frac{5}{16}$ in. and outside hopper sheets are $\frac{3}{8}$ in.

In the Pullman-Standard field survey, covered hopper cars were found with capacities ranging from 1,790 to 2,003 cu. ft. The most common figure of 1,958 cu. ft. was generally satisfactory to cement shippers, but 2,003 cu. ft. capacity was more attractive to shippers of soda ash and also considered all right for cement shippers. The smaller capacity car, 1,790 cu. ft., while theoretically large enough to carry a rail load of cement (by weight) was not acceptable to most shippers. The method of loading cement through long flexible tubes form the mills, causes it to become aerated and after loading, the cement settles about 18 in., making it necessary with the smaller capacity car to wait a period of time after the first loading and then finally again refill the car to obtain full

rail-load capacity by weight. The larger cubic capacity car permits loading a full rail load by weight with one filling without the second objectionable refill operation,

The car floors are sloped 50 deg, from the horizontal as cars in service with 45 deg. slopes were found to give difficulty in unloading. A few cars were found with 60-deg. slopes, but considerable study and testing showed the 50-deg. slope and lower center of gravity to be preferable.

The diameter of the circular hatches, 30 in., is generally acceptable and desirable because of ample space left for standing room on the roof and because it is easier to clean the top of the roof and around the hatches. All loading into this type of car is done through flexible tubes ranging in diameter from 6 in. to 14 in. Some shippers suggested cutting down the size of the loading hatches to 24 in. and a few said that 12 in. would be sufficient. The 30 in. dimension is preferable however, because it is necessary for men to enter and clean the car. The larger hatches assure ease of access and also plenty of air and light for men working inside the cars.

The hatch covers are equipped with locks that fasten each hatch cover securely and indivdually. The type of hinge and lock used assures a tight fit and permits swinging the hatch covers lengthwise of the car so that they lie flat on the roof. Moreover, locks may be operated without the necessity of men getting near edge of roof.

The hatch cover hinge pins are plain round bars bent at each end. It is common to find cars with hatch covers missing or in many cases with covers having no hinge pins. Use of the new design double bend pins will obviate this trouble.

In the survey, many cars were found with hatches extending only slightly above roof level. In the new design, the top of the hatch coaming is 6½ in. above the roof, thus preventing accumulated cement from interfering with proper operation of the hatch covers. This height also assures good coaming protection against water and allows more ease of cleaning.

The unloading gates, of standard design with 13-in. by 24-in. openings, are the flat gate, rack-and-pinion type made of cast steel. All unloading points are familiar with this conventional gate and equipped with canvas chutes for transfer of the load from cars to conveyors. In the new design, the same location of unloading gate is maintained with respect to center line of car and top of rail as on existing cars to permit full use of present unloading facilities.

The car is equipped with a center partition, allowing shippers to handle two different types of commodities or two different grades of cement in the same car to the same consignee, if desired. All inside corners of the car where the floor joins the sides are well radiused. The outside hopper chute plate is relatively thick (⅜ in.) to minimize damage from pounding with sledge hammers when some commodities fail to flow freely in unloading.

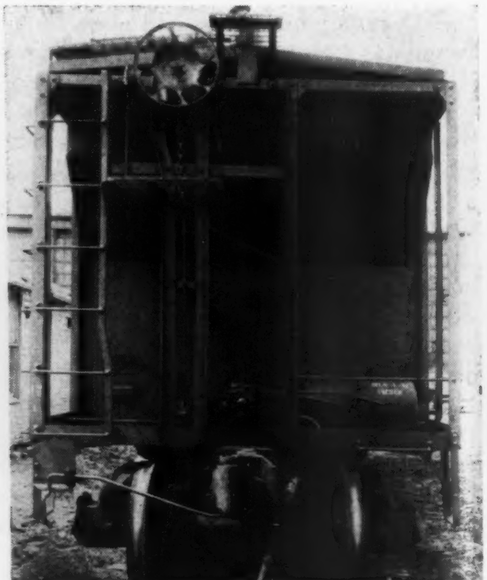
The rolled bulb-angle side plate has two main advantages: (1) With the conventional Z-bar construction, it is difficult as well as dangerous for workmen to clean the offset while standing on top of the roof. Some commodities, notably soda-ash, collect on the ledge of the Z-bar on existing cars and rains carry the soda-ash and other solutions down the side of the car with resultant early serious damage to the paint: (2) the bulb angle protrudes out beyond the side of the car and forms a "rain shed" well away from the side sheets thus protected from normal drainage of roof water or harmful solutions.

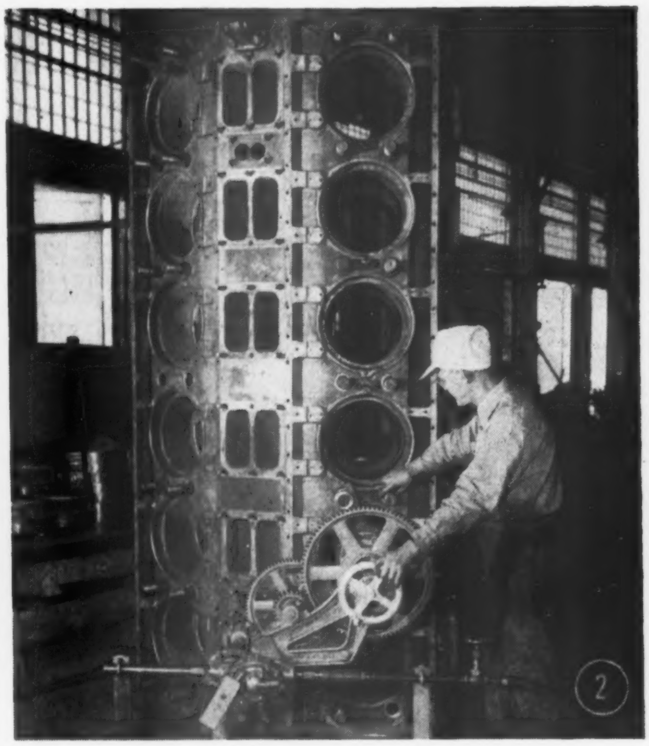
The new covered hopper car design is unusually flexible from an assembly standpoint and one set of welding jigs will permit lengthening the car from the conventional four-pocket cement car to a six-, or an eight-pocket car.

The conventional cement car, for example, is 29 ft. 3 in. long inside, 2,003 cu. ft. capacity, with two compartments, eight loading hatches and four unloading doors. The new design can be extended to provide a car 39 ft. 10 in. inside length with 2,840 cu. ft. capacity, three compartments, ten loading hatches and six outlet gates.

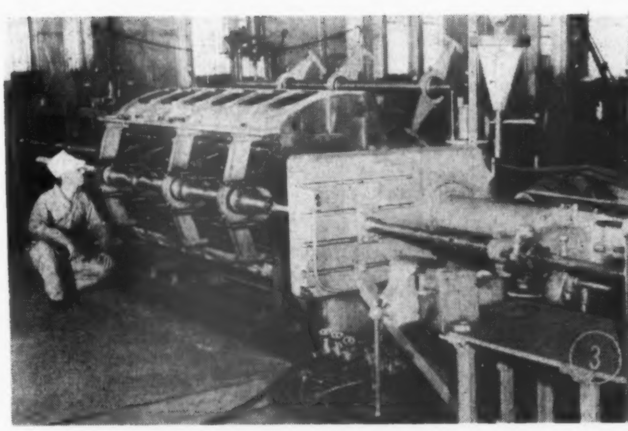
Further extendng, the design can be made larger for handling lighter bulk commodities to 42 ft. inside length, 3,188 cu. ft. capacity, 4 compartments, 12 loading hatches, and 8 unloading gates. These two extensions would provide cars for varying unit weights of lading with little change in production of cars as far as dies, jigs and equipment are concerned.

Pilot car of the PS-2 all-welded covered hopper car design. This car has the conventional side plate.





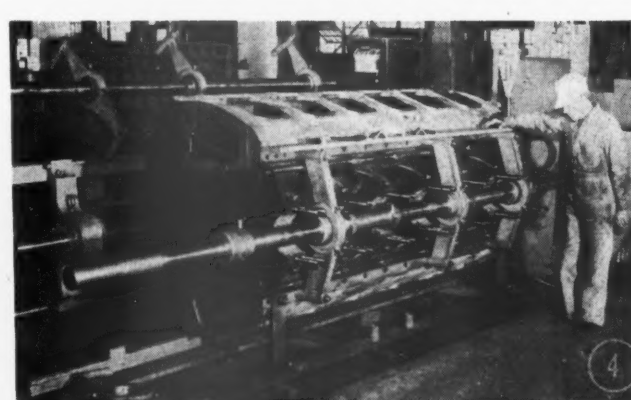
Steam Tools Can Fix Diesels, Too



THE rapid expansion of railway shop facilities for the repair and maintenance of diesel-electric locomotives has been accompanied by the ingenious adaptation of many types of machine tools formerly used only on steam locomotive work to new and varied uses. In instance after instance boring mills, turret lathes, drills and presses are being converted from steam to diesel work. Shop supervisors and machinists are showing more and more interest in applying their skill to adapting these machines to new tasks. In fact, this effort on the part of shopmen has meant that many have established jobs for themselves in the diesel scheme of things.

As a result of some shop-born adaptations, some builders have been quick to redesign their machines, the better to meet the requirements of modern diesel repair shops. Efficiency, technical standards of practice and procedures for the upkeep of the old iron horse developed through more than 100 years of experience and service. The abrupt transition to diesel motive power has presented railway mechanical departments with a brand-new set of problems. Today, these departments are just entering a new era—an era in which, in many instances, methods, standards, and the extent of repairs have yet to be established.

The following pages show a few examples of recent railway shop adaptations of older machine tools to the new diesel upkeep requirements.



1-2-3-4. **An Underwood portable cylinder boring bar, originally designed for boring and facing steam locomotive cylinders, has been adapted to the exacting job of boring both the liner holes and main bearings in an EMD 16-cylinder A frame. The two bars, 3 ft. and 7 ft. long, are shop made and the machine is operated by an air motor.**

Steam Tools Can Fix Diesels, Too

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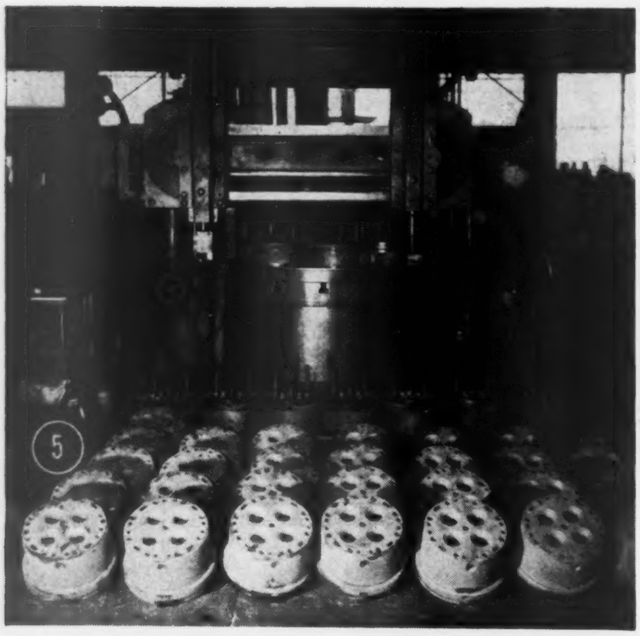
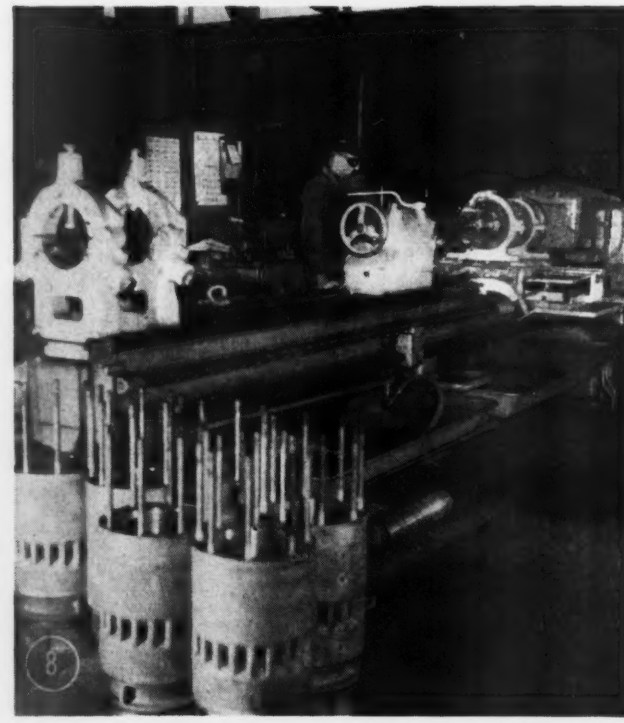
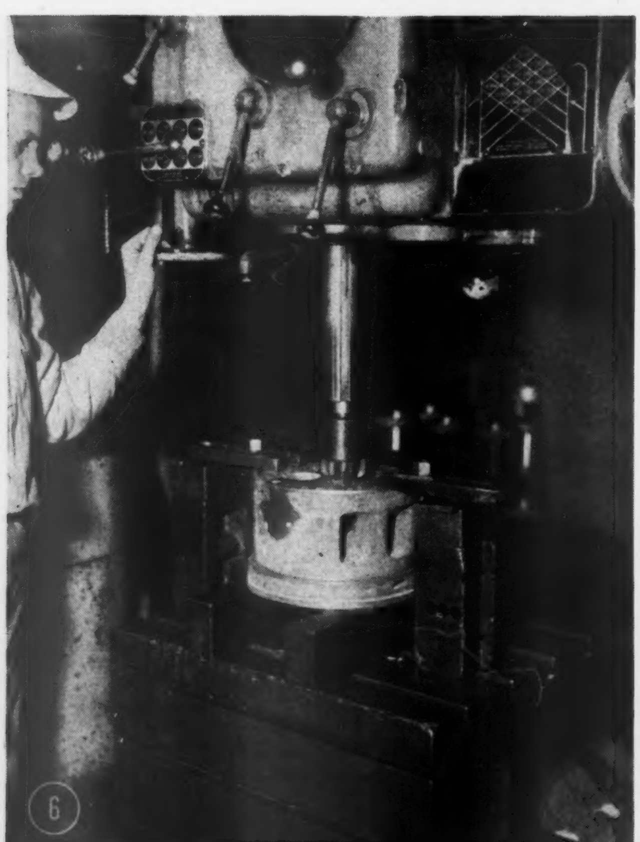
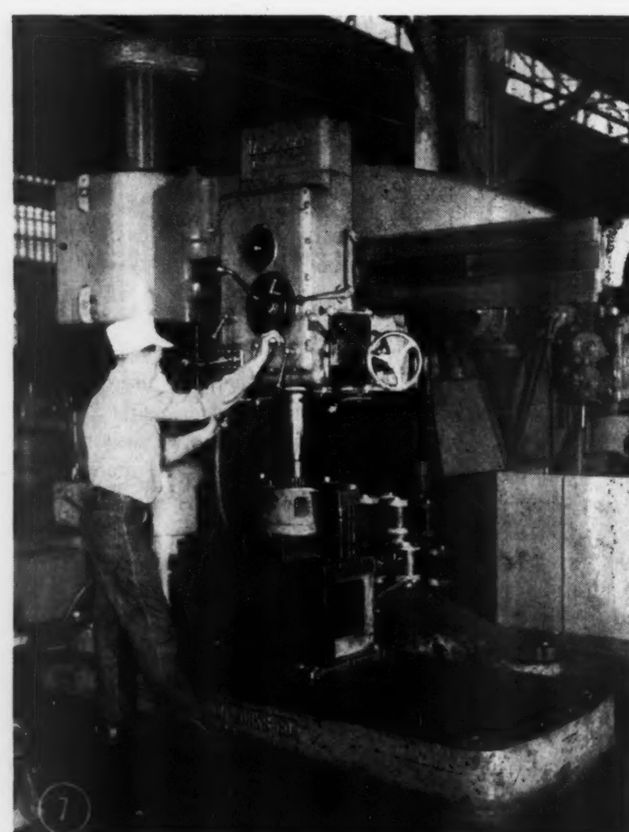




8. An American Pacemaker lathe, 22-in. by 12 ft., has a shop-made jig mounted for the boring of an EMD diesel-engine cylinder liner. Four operations involving boring and counterboring are performed simultaneously. The tools are carbide and this lathe does all of the liner boring for one large shop. Experiments are now being made with the object of installing liners direct from this lathe without honing.





5-6-7. Two machines engaged in rebuilding diesel-engine cylinder heads which have been reclaimed. The drill press, an American Hole Wizard model (5), reaming the valve seats in EMD diesel engine cylinder heads. The Putnam boring mill (6 and 7) has been adapted to lapping operations and seven diesel engine cylinder heads simultaneously. The lapping compound is used in a converted boring-mill base which has been made watertight for this job.

Steam Tools Can Fix Diesels, Too

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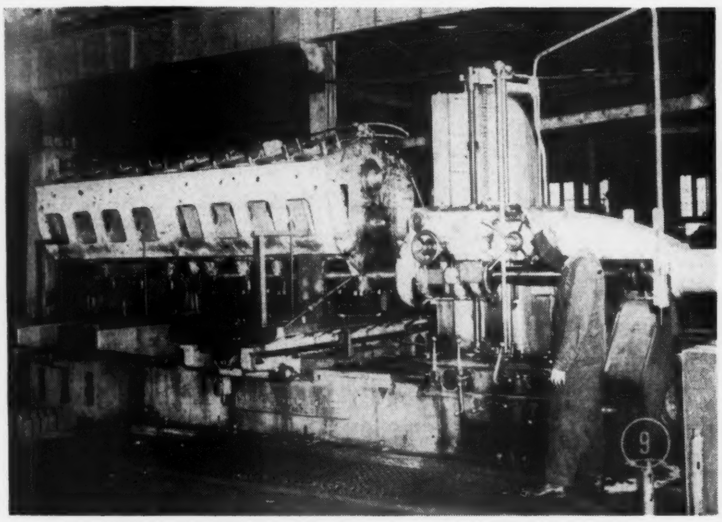
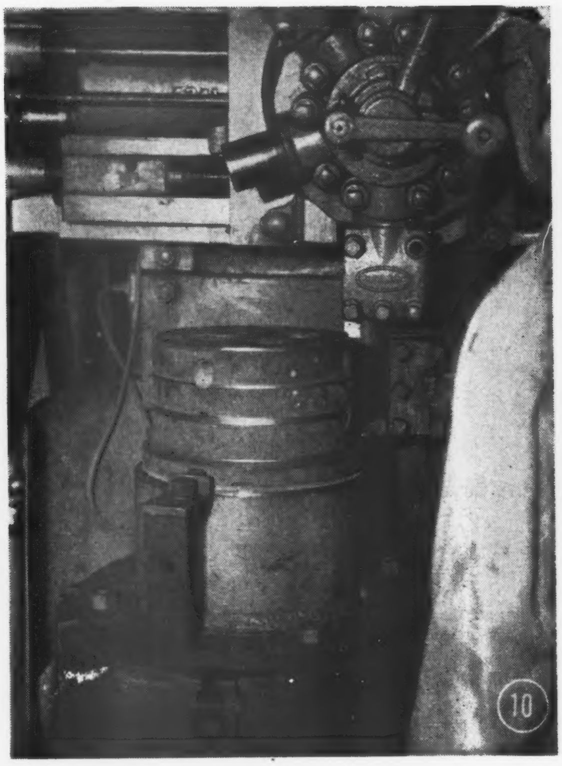
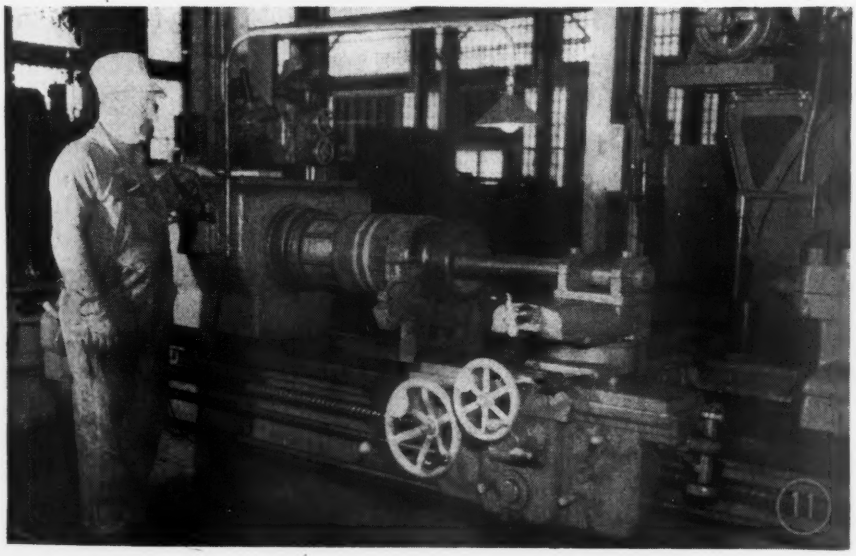


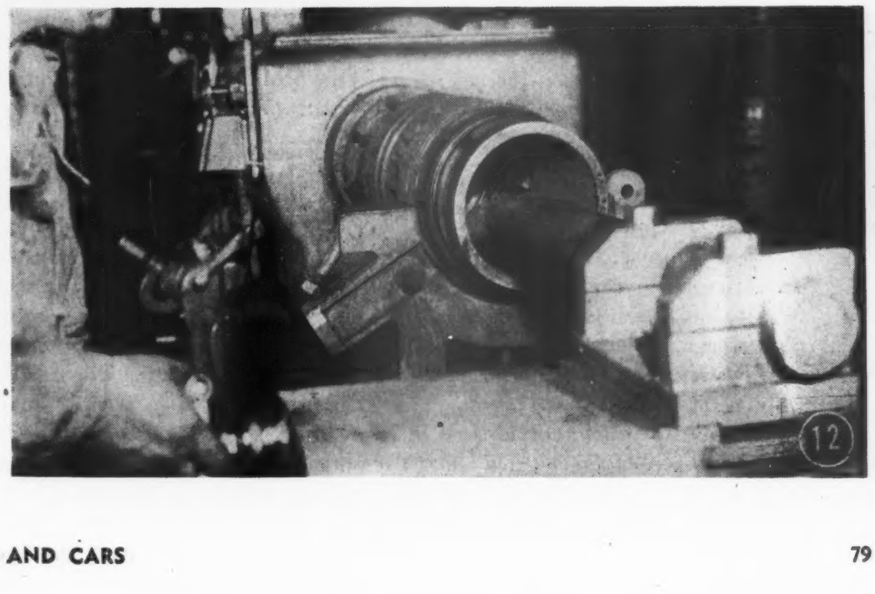


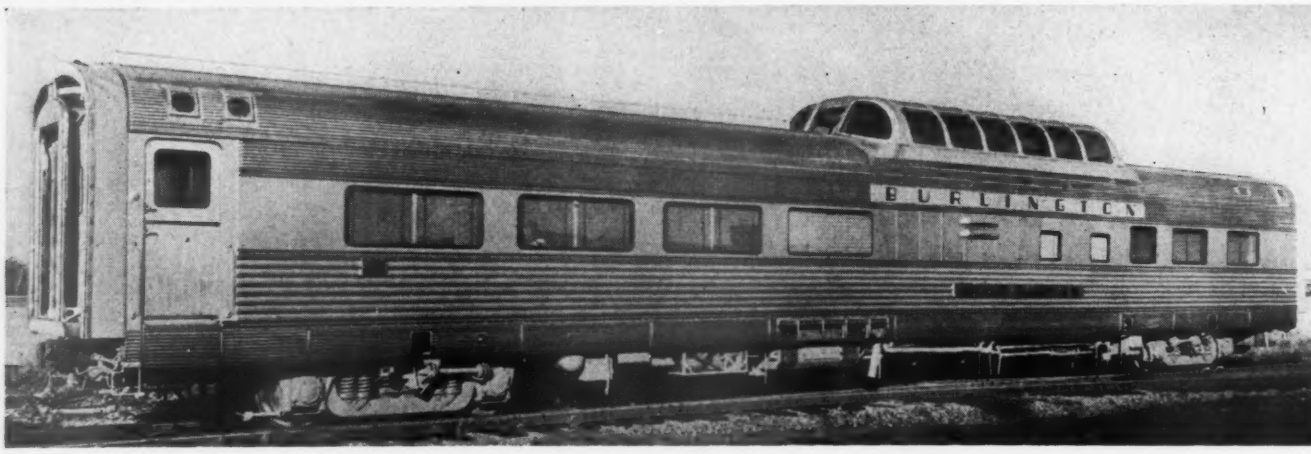


9. Bullard horizontal boring, milling and drilling machine to the bed of which a 70-tin. extension has been added, boring the main bearings in an A-frame for an EMD locomotive diesel engine. Originally the machine had a 9-ft. boring bar and now it uses a 1-6ft. by 6-in. diameter bar with five tools which cut at the same time. This machine has been utilized for this type of work for over two years.

10. Bullard vertical turret lathe machining a cylinder head after the reclamation job has been done by welding.

11-12. A 36-in. LeBlond engine lathe which is now equipped with a shop-made template, engaged in finishing reclaimed EMD diesel engine liners which involves boring and turning.





A Vista Dome coach-buffet-lounge car.

New Cars for More Burlington Zephyrs

Budd-built order includes three types of Vista-Dome cars, diners, coaches, and four types of all-sleeping cars weighing from 65 to 80 tons each.

THE Chicago, Burlington & Quincy has received 31 new passenger train cars of ten types for use in its new "Kansas City Zephyr" and "American Royal Zephyr" trains between Chicago and Kansas City-St. Joseph. These cars, all built by the Budd Company of stainless steel, are passenger-carrying types, except for one 74-ft. railway-post-office-baggage car. The 31 new Burlington cars have been assigned as follows: 17 (including four Vista-Dome cars) to the Chicago-Kansas City-St. Joseph service; six for service between Chicago and St. Paul-Minneapolis on the "Black Hawk"; five (including one Vista Dome car) for the "Ak-Sar-Ben Zephyr" which replaces the "Ak-Sar-Ben" between Chicago and Omaha-Lincoln; three for the "California Zephyr." Three additional cars were built to the same specifications for use in the "California Zephyr," two for the Western Pacific and one for the Denver & Rio Grande Western.

Decorations have been chosen for attractive but restful effects. Various shades of soft colors such as nut pine, rust, beige, brown, green, blue and various combinations of rose, gray and tan are employed in all of the passenger-carrying cars. Upholstery and drapes were furnished by Goodall Fabrics, Inc.

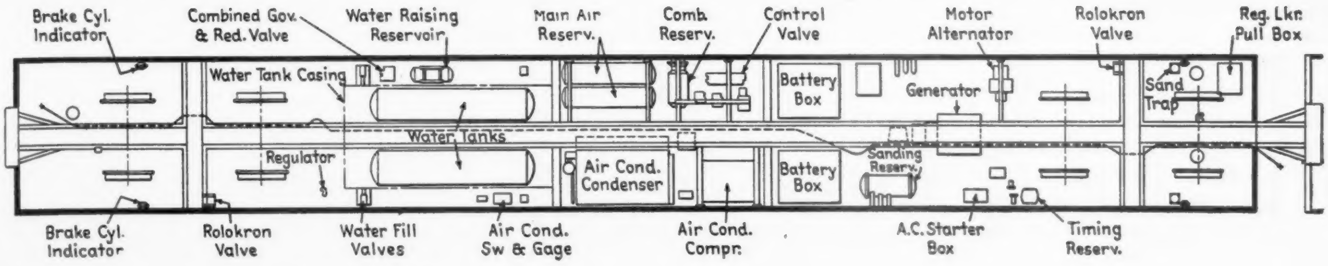
All passenger-carrying cars are carpeted with Lees-Cochran Hookset, except for end corridors and toilets, dressing rooms, etc. Toilet floors are covered with ceramic tile and wash rooms and end corridors with linoleum.

Each of the 50-passenger coaches has a dressing room at each end. Two toilet rooms open off the men's dressing rooms.

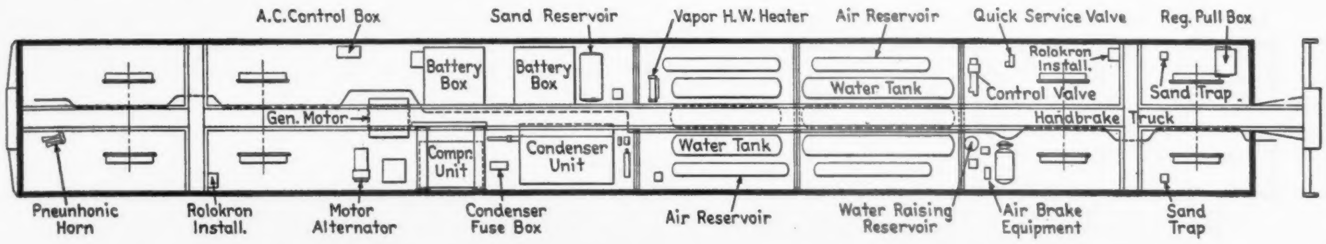
In the coach section the windows are 76½ in. wide and the seats are spaced 47 in. between centers. The rotating reversible seats have individual reclining backs. Underneath each seat is a special leg rest which springs up when a lever is pressed. There are also adjustable foot rests which are supported on the back of each seat and controlled by a foot pedal. Each seat is equipped with a built-in ash tray and a spring-clip ticket holder which includes the seat number. The backs and cushions of the seats are foam rubber. General illumination is furnished by seven fluorescent fixtures along the center of the ceiling. Incandescent reading lights over each seat in the underside of the luggage racks are controlled by each passenger.

The Vista Dome-coach-buffet-lounge car has an unusual combination of facilities. Entering the car at the non-vestibule end, the aisle passes between a men's room on one side and lockers on the other to the coffee shop. Here are seats for 17. The lighting is from fluorescent lamps in cornice fixtures along the sides and across the curtain wall between the two sections of the room.

From the inner end of this room a stairway ascends to the dome. The dome has seats for 24 persons. These are rotating reversible, but the backs are not reclining. There are individual foot rests. Backs and cushions are foam rubber. Fluorescent light fixtures are placed along



The underbody equipment of the 50-passenger coach.



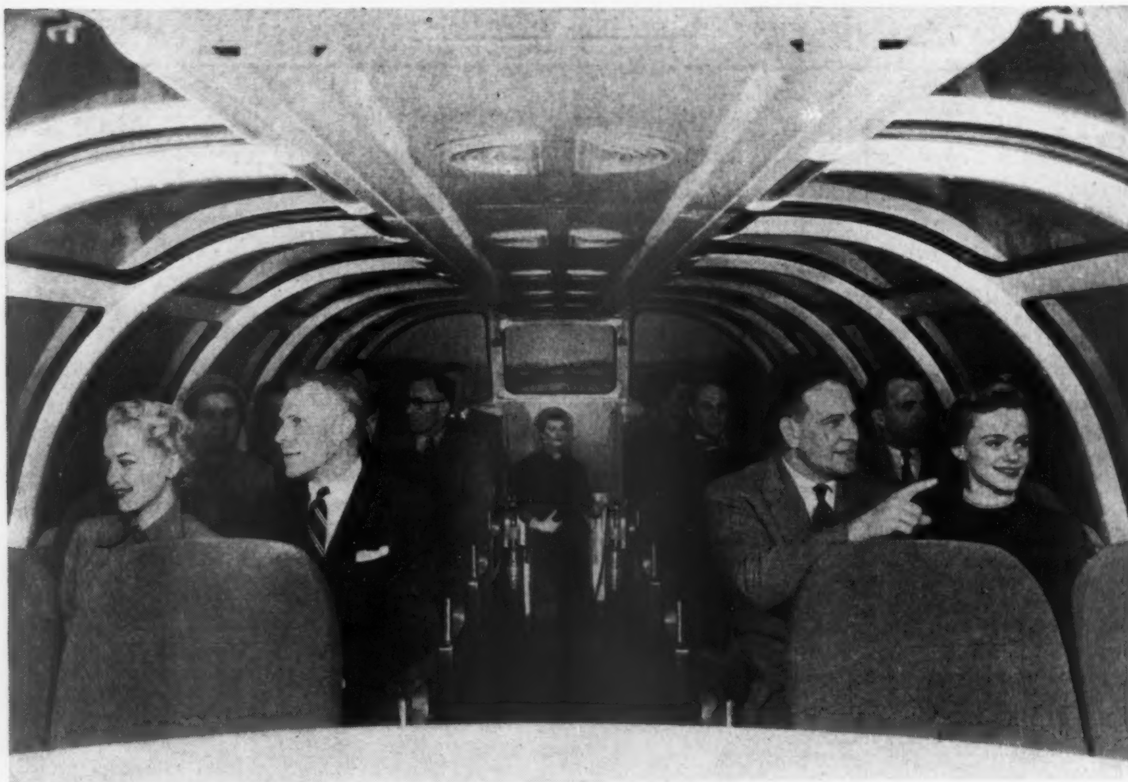
Arrangement of underbody equipment on the dome-parlor-observation car.

All cars have Budd disc brakes.

The 50-passenger coach has a large rest room at each end.

Small parlor section in the Vista Dome parlor-observation car.

Observation lounge in the Vista Dome bedroom-buffet-lounge car.



The outlook from the Vista Dome is in all directions.

NUMBER AND WEIGHTS (LB.) OF THE PASSENGER CARS BUILT FOR THE BURLINGTON

No.	Body, ready to run	Trucks	Total, ready to run
1. 74-ft. R.P.O.-baggage	65,000	39,900	104,900
4. 50-passenger coaches	89,800	40,500	130,300
3. 40-48 passenger diners	115,800	40,500	156,300
1. 32-passenger open-section sleeper	100,100	40,500	140,600
*6. 6-double-bedroom-5-compartment sleepers	103,100	40,500	143,600
2. 56-passenger dome-parlor-observation	111,800	40,600	152,400
2. 71-passenger dome-coach-buffet-lounge	123,100	40,700	163,800
6. 6-section, 4-double-bedroom, 6-roomette	105,300	40,500	145,800
1. 58-passenger dome-buffet-observation	119,800	40,600	160,400
8. 6-double-bedroom, 10-roomette	105,280	41,500	146,780

* For the "California Zephyr." Two of these cars belong to the Denver & Rio Grande Western and one to the Western Pacific.

the sides of the ceiling at the top of the dome. Incandescent lamps let into the bases of alternate seats illuminate the aisle when the top lighting is turned off.

At the right of the inner end of the coffee shop a passageway leads under the dome. Opening on the passageway is a small lounge with seats for six. Adjoining the lounge is a buffet section from which snacks and beverages are prepared and served.

Beyond the buffet section the passageway leads up into a 24-passenger coach section. At the inner end of this section is a dormitory. Within it are a folding lavatory and a single tier of three bunks for crew members. The coach section has reclining seats, like those in the 50-passenger coaches, for 24 passengers. Between the coach section and the vestibule are a conductor's space and a women's washroom.

The Vista-Dome parlor-observation car has a small parlor section with seats for seven passengers at the front end, with locker and luggage space between it and the vestibule. Back of this section, opening from the passageway under the dome, is a drawing room with seats for five. Beyond this are men's and women's toilets. Continuing to the rear, the passageway leads up to the parlor-observation section which continues to the end of the car. In this section are seats for 20 in individual movable chairs. From the front of this room leads the stairway to the dome section. The rear end of this car is not curved, but has observation windows on either side of the end door. It is provided with a diaphragm.

Looking into the kitchen of the dining car from the pantry.

The dining cars have seats for 48 when all the tables in the main dining section are adjusted to seat four persons each. The dining room is divided into three sections. At each end are a pair of banquettes, each seating four. The ceiling over the banquette sections is dropped below that in the main section. The dining-room lighting is from continuous fluorescent cornice fixtures along each side of the room.

The Sleeping Cars

Six of the sleeping cars include three types of accommodations each. There are six open sections, with upper and lower berths, six roomettes, and four double bedrooms.

In the roomettes the berths can be lowered at any time by the occupant without having to move from the room or use the curtains. This is accomplished by narrowing the foot of the berth and by relocating the toilet. A large fluorescent fixture in the middle of the ceiling furnishes general illumination. Incandescent fixtures provide reading light.

The car is fitted with a circulating ice-water system. All controls for light, heating, and air conditioning are mounted on a simple panel which can be reached from a sitting position by day or from the berth at night. Etched steel instruction plates have replaced decalcomanias, simplifying, repainting and insuring good legibility.

There are four double bedrooms in this car. Two of these are of the transverse type and the others of the longitudinal type. Folding partitions permit a transverse and a longitudinal room to be made en suite when desired. Each room has completely enclosed toilet facilities. A door in the folding partition permits communication between rooms, if desired, without removing the partition. Lighting and the arrangement of controls in these rooms are similar to those in the roomettes.

The six-double-bedroom, 10-roomette cars provide accommodations like those in the car just described. At the vestibule end, adjoining the roomettes, are a porter's seat and berth station and a toilet opposite.

The open-section sleeper has no room accommodations. It has the customary dressing rooms at the ends. Two separate toilets open from the men's room.

The dome-bedroom-buffet-observation car differs from the other observation cars in that it has an oval near end. At the front end there is a porter's seat and berth and a general toilet. Back of these are three double bedrooms and a drawing room. Two of the bedrooms are longitudinal and one is transverse. The transverse bedroom and one of the others are separated by a folding partition and can be used en suite.

The entire length of the space under the dome is occupied by a buffet lounge with seats for 12 and a bar at the rear end. Beyond the dome section is an observation lounge. Here are chairs for nine persons and, facing the rear, two built-in settees each with seats for two. From the front of this section the stairway leads to the dome section, where there are seats for 24 passengers.

Six sleeping cars, each with six double bedrooms and five compartments—three for the Burlington, two for the Western Pacific and one for the Denver & Rio Grande Western—were built for "California Zephyr" service. The rooms are arranged so that three pairs of a bedroom and a compartment and one pair of compartments are separated by folding partitions and can be combined en suite.

Structural Features

The cars are all of Budd modified-girder stainless-steel construction except the Vista Dome cars which are modified truss type construction. The underframes at the ends of the cars are Youngstown steel weldments. The railway-post-office-baggage car is 73 ft. 10 in. long, coupled. All passenger-carrying cars are 85 ft. long. The width is 9 ft. 10⅜ in. outside. From the rail to the top of the roof is 15 ft. 9⅜ in. for the dome cars and 13 ft. 6¼ in. for the others. Weights are shown in a table.

The passenger-carrying cars are insulated throughout with 3 in. of Ultra-lite fiber-glass in roofs, end and side walls, and floors. End doors and side service doors are insulated, as are also kitchen, pantry and buffet partitions. Sound-deadening material is sprayed on the inside of sides, ends, floors and roofs, and compressed insulation enclosed by steel sheets, forming in effect a double floor is applied over trucks of passenger-carrying cars, except at the kitchen end of the diners.

Interior finish of the passenger-carrying cars, including walls and ceilings, is largely sheet aluminum. Exceptions are the passageway walls from coach section to end doors, walls and ceilings in the kitchen, pantry, buffet and bars, which are stainless steel, and certain locations in the dome-coach-buffet-lounge car and the dome-parlor-observation car, where metal-faced plywood is used. In general, partitions not involved in the load-carrying structure of the car are either plywood, faced on both sides with bonderized zinc-coated carbon steel, or rectangular steel tubing faced with metal on both sides.

The floors of the passenger-carrying cars are Penta-treated plywood which is applied directly to the top flanges of the stainless-steel subfloor, but separated from the metal by sound-deadening material.

Windows in the bodies of the passenger-carrying cars are Adams & Westlake double-glazed breather type. Those in the coaches and dining cars are unusually wide. In the coaches the sashes are 76½ in. wide. Passengers in two double seats sit alongside each window and a center guide for the venetian blinds is installed so that there is a separate blind alongside each seat. In the main dining section the windows are 67½ in. wide.

Side windows in passenger sections are glazed with ¼-in. Solex tempered glass on the outside and ¼-in. clear laminated glass on the inside. Dome sashes are also double-glazed breather type. The outside glass is Solex, tempered; inside, laminated Solex, non-tempered.

Air Conditioning

All cars, except the R.P.O.-baggage car, are fitted with Frigidaire electromechanical air-conditioning equipment with Trane full-flooded condensers. Compressors are driven by two-speed motors. Evaporators are in two sections, except that blowers which supply the domes are arranged for two speeds and operate with a single evaporator coil.

The capacity of the units in all non-dome sleeping cars is seven tons with a total air circulation of 1,600 cu. ft. per min., of which half is fresh air. The 50-passenger coach has an eight-ton unit and a maximum air circulation

of 2,400 cu. ft. per min., of which one quarter is fresh air.

The unit in the dining car is of 10 tons' capacity and handles a total of 2,800 cu. ft. per min.—1,800 cu. ft. per min. through the dining room and 1,000 cu. ft. per min. through the kitchen, each in a separate system. The dining-room system delivers air, of which 500 cu. ft. per min. is fresh and 1,300 is recirculated, to the dining room and passageway. The kitchen system delivers all fresh air to the kitchen and pantry and to an air curtain around the opening between the pantry and foyer. This induces air motion from the foyer to prevent cooking odors from entering the dining room.

The three dome cars are each provided with two separate units, each of six tons' capacity. One serves the normal and lower floor levels; the other, the dome. Part of the air to the dome is delivered through Anemostats in the ceiling over the aisle. These direct the air toward the passengers seated next to the aisle. The remainder of the air is delivered from slots along the sides of the ceiling in a layer which flows down alongside of the windows. A heat-sensitive thermostat in the dome cars automatically reduces the amount of cooling in the dome section when the sun load goes off.

All fresh-air intakes, except at the kitchen end of the dining car, include Farr viscous filters, Dorex odor absorbers, and Electro-Airmat units composed of an ionizer and Airmat filter. Return air passes through ceiling grills into a plenum chamber housing the evaporator where it mixes with the fresh air. A blower pulls the mixed air through the Electro-Airmat unit and forces the air through the evaporator unit into an overhead duct from which it is distributed.

Baffle Air panels are employed in the main coach, the main dining section of the diner, and in the aisle between open sleeping-car sections. Anemostats are installed in all sleeping rooms, in the various lower-floor sections of the dome cars, in the kitchen and pantry of the diners, and in wash-rooms and passageways.

The passenger-carrying cars have the Vapor zone-control heating system. This includes the floor system of aluminum finned radiation and overhead heating coils which are a part of the air-conditioning evaporator units. The overhead heat circuits are operated from thermostatically controlled valves above the ceiling. These are equipped for manual remote control in emergency.

In the sleeping cars the main control panel permits manual changeover from heating to cooling. On other cars the changeover is automatic.

The electrical system on these cars is 32-volt d.c. Power is supplied by Safety genemotors and Spicer drives, except on the mail-baggage car. This has a 5-kw. generator driven by V-belts. All other cars, except the diners and dome-bedroom-buffet-observation car, have 25-kw. d.c. generators with 32-hp., 220-volt, 3 phase a.c. induction motors. On these cars the generator capacity is 30 kw. Batteries on the passenger cars are Exide EPTB-45 of 1,294 amp.-hr. capacity. Two of these batteries are installed on the dining car. The railway-post-office-baggage car has an EPTA-25 battery of 500 amp.-hr. capacity. Motor alternators with a capacity of 2 kw., generating 60-cycle single-phase current at 110 volts, are installed on all passenger cars. The diner, the 50-passenger coach and the six-double-bedroom, five compartment sleeping car each has one unit; the others two.

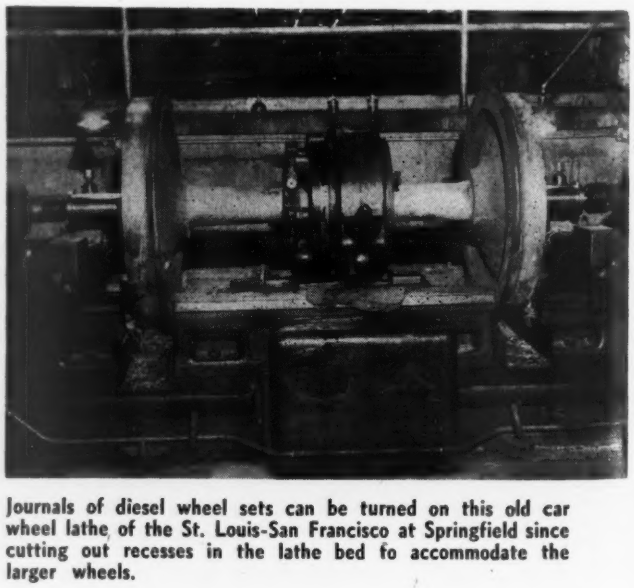
Except for the dome-coach-buffet-lounge cars, only those intended for operation in the "California Zephyr" are equipped with radio and public-address systems. The latter cars have essentially the same equipment as is now on the cars originally built for the "California Zephyr" service. On the dome-coach-buffet-lounge car the receiver is mounted in a locker in the enclosed buffet. Speakers are placed in the coffee shop, the small lounge and in the dome. There is no speaker in the coach section. The dome speaker can be turned on or off at the receiver.

The trucks for all cars are General Steel Castings four-wheel type with 6-in. by 11-in. journals and Timken roller bearings. The wheel base is 8 ft. 6 in. The trucks have swing hangers, coil bolster springs, longitudinal anchor rods and Canton Drop Forging equalizers. They are fitted with roll stabilizers and have two shock absorbers each to dampen vertical motion and lateral motion of the bolster. Each truck of the diner, the dome-bedroom-buffet-observation car and the dome-parlor-observation car is also equipped with two end transom shock absorbers. Miner safety-locking center pins are installed.

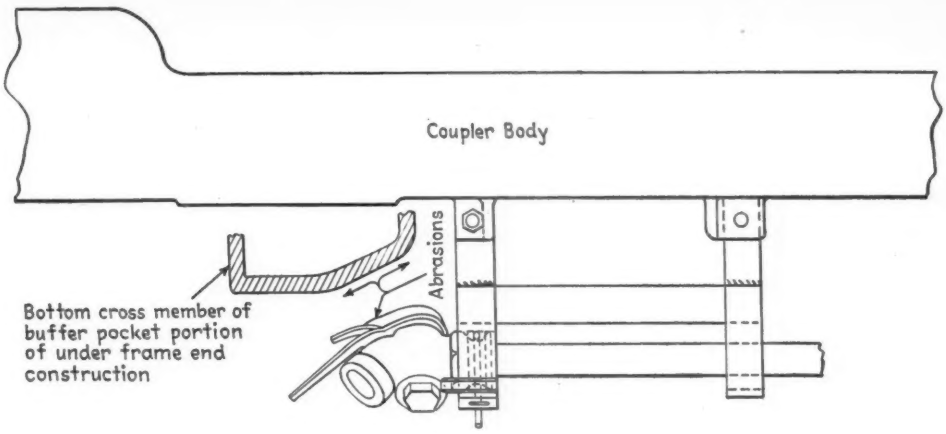
The air brakes on all cars are the Westinghouse H.S.C. type with D-22-BR control valves and electropneumatic straight-air control. Each axle is equipped with the Rolokron anti-wheel-slide device. New York Air Brake pneumatically operated unidirectional sanding equipment operates on both wheels of the leading axle of the leading truck on each car. The operation is controlled by the Rolokron and each operation is limited to 20 sec. Budd disc brakes are applied on all trucks.

The steam train line is 2½-in. Byers extra heavy wrought-iron pipe. Except for the train line copper tubing is used throughout. All exposed steam lines are covered with Thermowrap. The water-piping system is copper tubing, except where pipes are exposed inside the car. Here bright-finish chrome-plated brass is employed. Air-brake piping is also copper tubing, except on the trucks and the pipes to the conductor's valve and signal valve on the ends of the cars. These are extra-heavy wrought iron.

The cars have Waugh WM-6-DP double-acting rubber draft gears and tight-lock couplers.



Journals of diesel wheel sets can be turned on this old car wheel lathe of the St. Louis-San Francisco at Springfield since cutting out recesses in the lathe bed to accommodate the larger wheels.



Sketch of the location of the angle cock the closure of which caused the accident.

Closed Angle Cock Cause of Washington Wreck

Contact with bottom coupler carrier permitted closure en route. Location contrary to specifications.

THE Interstate Commerce Commission has recommended that all passenger-train cars equipped with tight-lock or similar type couplers operated over any railroad subject to the Interstate Commerce Act be inspected immediately, and that such cars on which any angle cock is so located that the handle can come into contact with any other portion of the car be withheld from service until such condition is corrected.

This recommendation was made by the commission's Division 3 in its report on the January 15 accident at Union Station, Washington, D. C. The investigation was docketed as Ex Parte 184, decided on February 15, and the report was by Commissioner Patterson.

Commissioner Knudson noted that he approved "only the statements of fact and the findings" in the report. The other member of the division is Commissioner Johnson.

On the morning of January 15, the Boston-to-Washington "Federal" smashed into the station concourse in Washington, injuring 87 persons. The concourse floor gave away. The rear of the locomotive dropped into the lower-level baggage room, and three head-end coaches piled into the concourse area.

New Haven coach 8665 was the third car in the 16-car "Federal" the day the accident occurred. Division 3 said the angle cock at the rear of this car became closed—"obviously as a result of contact between the handle and the bottom cross member"—making brakes on the rear 13 cars of the train inoperative from the locomotive.

"Because the air brakes on the rear 13 cars could not be applied from the locomotive after the angle cock became closed, the engineer was not able to stop the train short of the end of the station track No. 16," the report stated.

After the accident occurred the angle cock and air hose at the rear end of the third car was removed before the car was examined thoroughly, the report said. An examination of the second car was made, this car being of the same construction as the third. The rear of the second car was not damaged.

Clearances Measured

"With the car uncoupled and the coupler at the undamaged end in normal coupling position the clearance between the top of the angle cock handle and the bottom cross member of the buffer pocket was 2 inches, and that between the top of the coupler head and the bottom of the top cross member was 3⅝ inches."

The angle cock was located directly under the bottom cross member instead of 4⅛ in. back of the inside face of that member as specified by the New Haven. Abrasion marks were found on the top of the angle-cock handle on this second car. Other abrasion marks were found on the bottom side of the bottom cross member. Subsequent examination of the rear end of the third car disclosed similar marks in approximately the same location, the report said.

"There were also abrasion marks showing that the coupler heads of the second and third cars had been coming in contact with the top cross members of the buffer pockets," the report continued.

The fourth car of the "Federal" was a combination

baggage-coach car, equipped with conventional type couplers. The third car, No. 8665, was equipped with tightlock couplers.

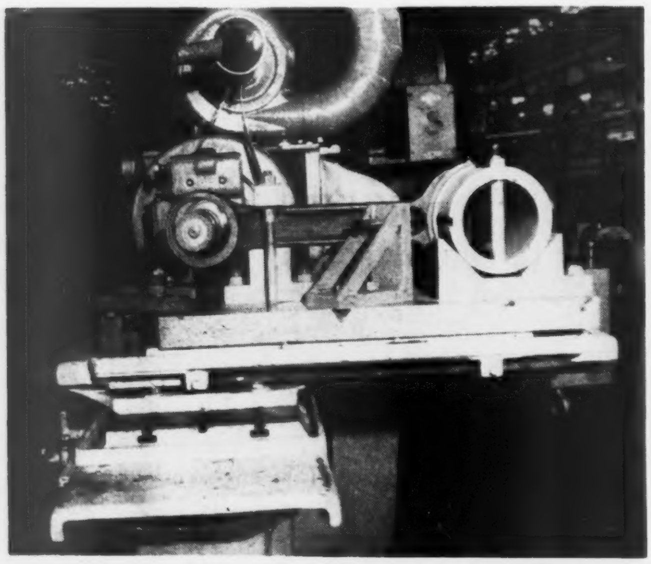
The contrast in design of these couplers and the truck-spring assemblies "undoubtedly resulted in a considerable increase" in the frequency and intensity of vibrations of the angle cock at the rear of car 8665. Abrasions on the handle of the angle cock and the bottom cross member indicated that the handle had repeatedly come in contact with the cross member, the report said.

"As the ankle cock was so located that contact could be made while the coupler body and the angle cock were moving vertically, and either longitudinally or laterally, it is apparent that as a result of these contacts the handle was unlatched and moved toward closed position a sufficient distance to close the angle cock."

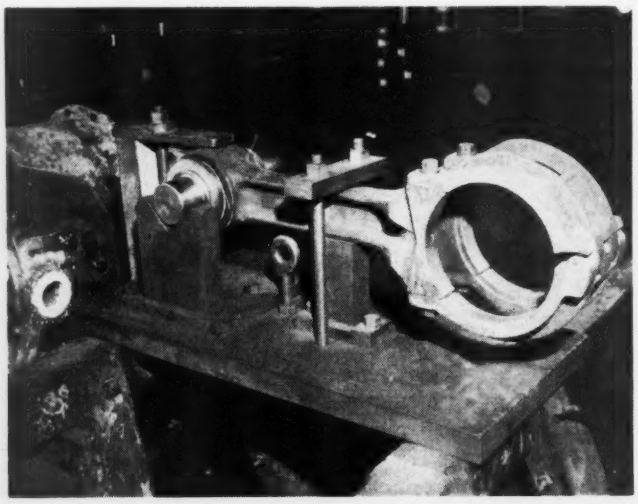
Examination of equipment after the accident disclosed the engineer had successfully obtained an emergency application of the brakes of the locomotive and the first three cars of the train. No effective application was obtained on the other cars, the report said.

Shortly after the accident occurred, the report said, an employee attempted to separate the air hose between the third and fourth cars. He found a "considerable amount of air pressure" in the hose and he opened the emergency valve at the front end of the fourth car. There was a forceful exhaust. Brakes on the fourth, fifth and sixth cars became applied. (Other cars to the rear had previously been removed by a yard engine.)

This employee then discovered the angle cock at the rear of the third car was "about 80 deg. from fully open position." Subsequent tests indicated that the port of the angle cock completely closed when the handle was moved 65 deg. from fully open position, the report said.



Jig for aligning a fork rod to grind the eye after building up with Sprayboard.

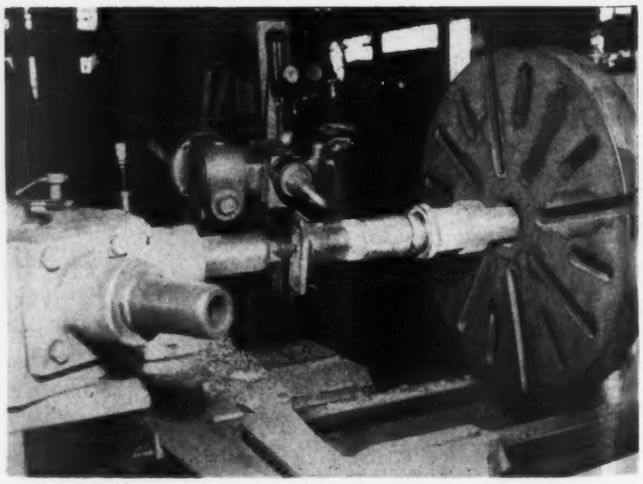


A similar jig is used to align rods for grinding the built-up surface of the baskets.

Metal Spraying on the Burlington

Metal spraying is used for a wide variety of diesel locomotive parts repairing jobs at the CB&Q West Burlington shops. Three different surfaces—mild steel, stainless steel and bronze, in addition to the bonding material—are applied to build up the different parts. The stainless steel surface applied tests over 50 Rockwell and has been found particularly good for shaft surfaces where roller bearing inner races fit as such surfaces are normally softer than the inner race and consequently tend to wear. The sprayed metal is an improved bearing surface over the parent metal.

Operations preliminary to the actual metal spraying are similar for all types of surfaces. An essential first step is to have the parent metal surface absolutely clean. Sandblasting is sufficient for this cleaning in most cases; it is not normally necessary to roughen up the surface.



Small parts are held in a lathe for metal spraying, large ones, on a 3-ft. diameter table.

After sandblasting, a layer of bonding metal, termed Spraybond, is applied to a thickness from .003 to .004 in. The Spraybond thickness is limited to this amount for most jobs even though it is a satisfactory hard surface

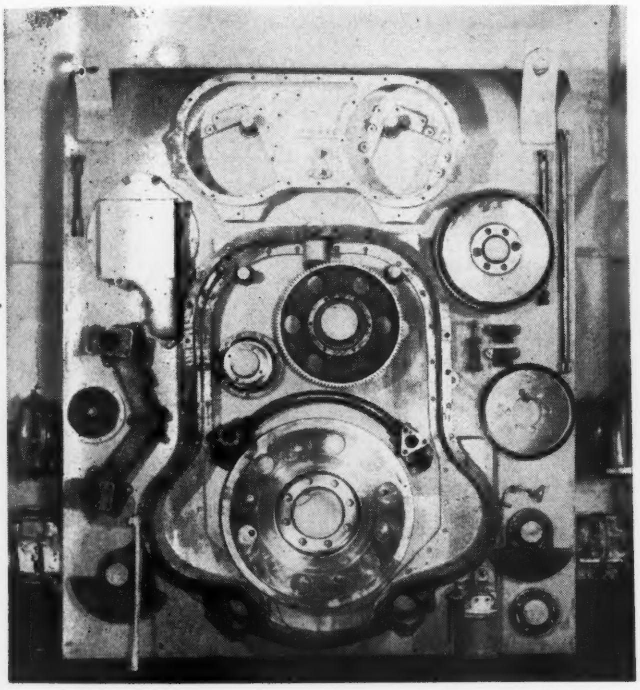
because it costs several times as much as one of the three finishing metal sprays. Because of this higher cost, Spraybond in thickness greater than .003 in. is used only when an extremely hard surface is needed.

The principal surfaces built up by Spraybond only are connecting rod baskets and the eye on both blade and forkrods. For such operations the Spraybond is merely applied and ground as shown in one of the illustrations. Spraybond is also used for building up worn guides on piston carriers.

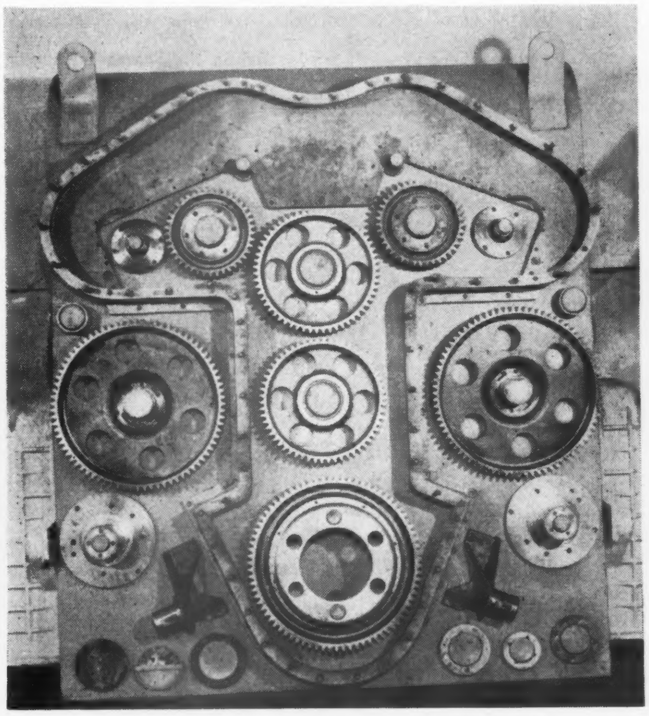
Spraybond plus stainless steel are used for many applications—blower shafts, water pump shafts, cooling fan drives, roller bearing shaft surfaces of air compressor crankshafts, engines for driving under-car air conditioning units and armature shafts of miscellaneous motors and generators.

Spraybond plus bronze is used for building up slack adjuster nuts on diesel locomotive trucks and for water pump bearings. The bonding metal plus mild steel combination is not used extensively but only for odd jobs.

The speed, feed, temperatures, etc., used for the various spraying jobs, are in accordance with instructions put out by the manufacturer of the equipment. The metal spraying is done either on a table 3 ft. in diameter or on an engine lathe adjacent to it. The table is revolved slowly by an air motor at the speed desired. The lathe is normally used for parts small enough to be set up on the lathe centers, the table for larger parts.



The rack for the governor end.



The rack for the gear train end holds parts on both sides.

Storage Rack for Diesel Engine Casings

Four storage racks are used at the Southern's Pegram shops at Atlanta, Ga., for storing and dipping most of the parts removed from the ends and sides of diesel engines during overhaul. The racks are of all-welded construction of ¼-in. plate and have studs with copper covers to avoid damage to bearings and gears. Each rack is of sufficient size with suitably located studs to accommodate all the parts of the particular side or end for which it is to be used.

The rack for the governor end holds everything from this end except the governor, including the overspeed trip housing, the oil screen housings, the crossover oil pipes, oil pumps and water pumps, miscellaneous gears and small parts. The rack for the gear train end holds the blower supports, which bolt on the ends, the blower drive gears, the gear casing and camshaft gears. The racks for each side hold all pistons and rods, heads, studs, rocker-arm assemblies, oil pipes, camshaft, etc.

The procedure involved in using these storage racks is first to remove the parts to go on each rack and affix them to the rack as removed. The rack with the parts in place is then sent to the lye vat where the parts are dipped. The inspection department examines the individual parts, after which they are sent to the various locations within the shop for repairs. Upon completion of the overhaul the parts are treated with rust preventive and re-applied to the stand for storage. They are held until needed to build an engine. No attempt is made to return the parts from a given engine back to the same engine; any part goes with any engine, although it normally remains with the set with which it was removed.

The storage racks are about 15 in. wide on the bottom and taper to an 8-in. width on the top. All four racks have two 10-in. holes in the back for draining the cleaning solution after the rack and its parts have been dipped in the lye vat.

Two wheel checkers like this are located on the approach hump in Potomac yard.

Wheel Checker Detects Broken Flanges

A DEVICE to detect broken flanges on car wheels was installed a few months ago by the Richmond, Fredricksburg & Potomac, on the approach to the hump in the southbound classification yard in Potomac yards near Alexandria, Va. On January 11, this device detected a wheel with a 14-in. section of the flange broken out. On the following day, a wheel with a 12-in section broken out was detected. These are the first known instances in which broken flanges on car wheels have been detected by electrical devices while cars were moving.

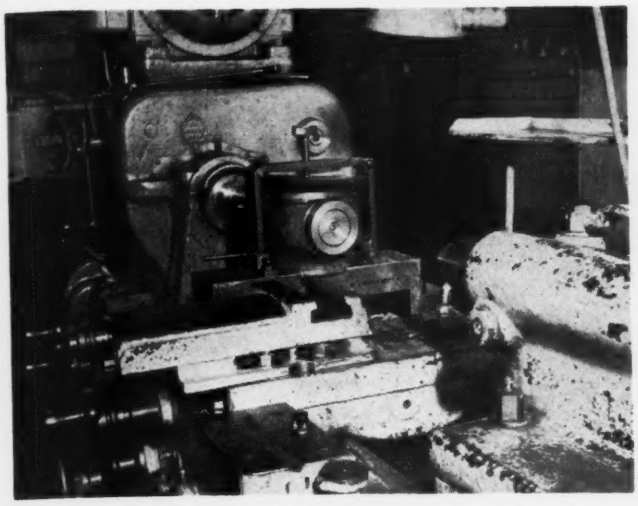
The broken-flange detector consists of a series of spring steel fingers, placed at right angles to the rail, with an insulated stainless steel pad near the end of each finger. The upturned end of each finger extends about three-quarters of an inch above the top of the rail.

When a normal wheel runs over the unit, its flanges encounter the insulated stainless steel pads, thus depressing the fingers away from the wheel. If a section is broken out of the flange, the steel finger under the break will not be depressed, and the upturned end of the finger will make contact with the wheel, thus shunting an electrical circuit through a relay. Contact of the wheel with any portion of a finger, except the insulated steel pad, is sufficient to shunt the relay. When thus de-energized, the relay causes a bell to ring, and a lamp to be lighted, in the hump conductor's office, thereby indicating that a defective wheel has been detected.

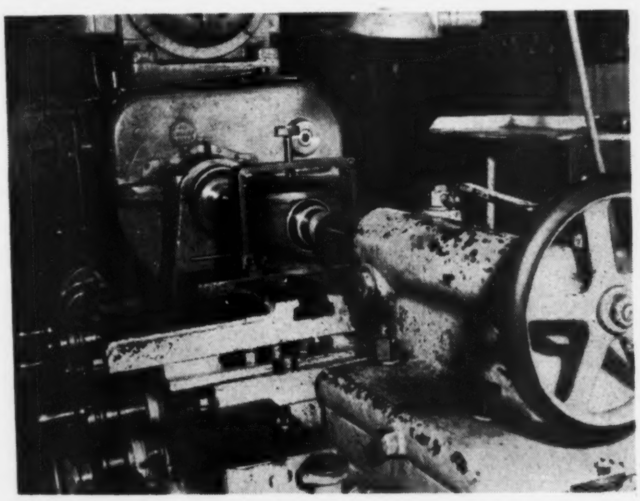
A detector, as shown in the picture, was installed for each rail. Each such detector is 12 ft. 4 in. long, which is more than the circumference of a wheel 42 in. in diameter. The spacing of the fingers and adjustments are such that a break in a flange, at least 3½ in. long and within ⅝ in. of the tread, will be detected. A guard rail placed opposite the fingers acts as a guide for the wheels. This device will also detect a loose wheel if it fails to stay on the insulated steel pads. These wheel checkers are designed to operate with a train moving at speeds up to 20 m.p.h. With electronic relays, train speeds can be increased to 30 m.p.h. or perhaps more.

The first broken flange ever detected on a moving car by electrical means.

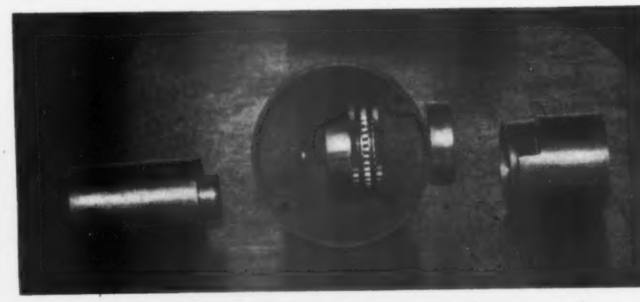
These devices, known as wheel checkers, were invented and developed by W. A. and M. W. Gieskieng, 1333 South Franklin st., Denver 10, Colo. An installation on the Ventura County Railway in California has been in service more than a year. A heavy-traffic trunk-line western railroad has had a test installation in service on main track for several months.



The jig aligns the semi-finished bushings horizontally and vertically; the tapered collar on the end of the boring bar aligns them axially.

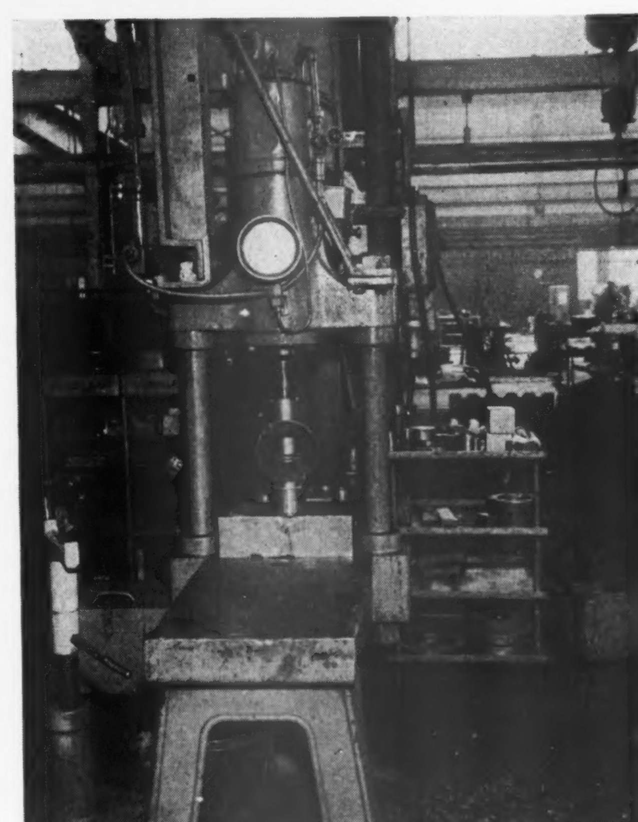


Once aligned, the carrier is secured in place with the thumb screw and both bushings bored in one set-up with a straight brass tool.



The special broaching tool is in three parts, the two end pieces serving as positive guides for true axial broaching.

How the three parts of the special broachng tool fit together for cutting the oil grooves.



Broaching is done on a hydraulic press at an average pressure of five tons, after which burrs are removed by a hand scraper.

Reconditioning Piston Carriers

The West Burlington shops of the CB&Q has developed procedures for reconditioning piston carriers when the bushings or the guides become worn to the allowable limit. Worn guide surfaces are first sand-blasted then built up by metal spraying.

Reconditioning piston carrier bushings requires several steps and two special tools. The old bushings are pressed out, the carrier Magnafluxed, and the new bushings pressed in. These are brass bushings purchased with the outside diameter finished to the press fit size but with the inside diameter semi-finished.

The two bushings are bored in a single setup with a special fixture (shown in two of the illustrations) which is attached to the lathe carriage. The fixture is self-aligning by a tapered pin on each end which aligns it to the lathe carriage, after which the fixture is bolted.

The bottom diameter of the carrier fits in a circular recess in the base of the fixture which places both bushings centrally with the lathe spindle and at the correct height for boring. Axial alignment of the two bushings with the lathe spindle is achieved by a removable tapered sleeve which was developed for this operation and which fits over the end of the boring bar.

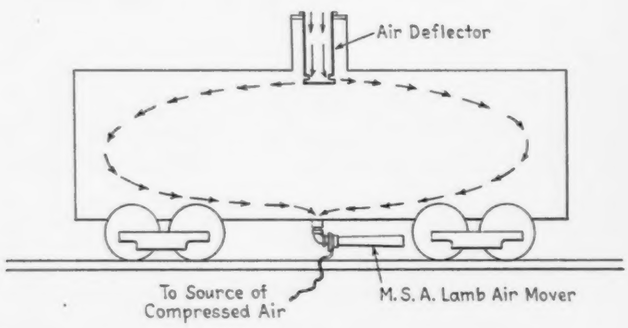
With the carrier mounted loosely in the jig so that it is free to turn in the recess in the jig base, the ta-

pered sleeve is slipped over the end of the boring bar and pushed until it comes against a shoulder. This gives the final alignment of the carrier bushing to the boring bar. With the boring bar and the two bushings lined up axially the carrier is secured in this position by a thumb screw and a steel plate. The tapered sleeve is then removed and the tail stock dead center moved into position to support the free end of the boring bar. The boring is then done with a straight brass tool.

The oil grooves are put in the bushing with a special broach developed for this operation. The broach is in three parts which, when assembled, assure continuous guide surface for pressing the broach through the bushings to avoid axial misalignment. The broach has three sets of cutting teeth with a feed of .003 in. between succeeding sets.

Broaching is done on a hydraulic press and requires an average pressure of about 5 tons. Upon completion of the broaching in the press, the burrs are taken out with a hand scraper and the carrier is ready for use.

Tank-Car Degassing Time Cut 16 to 1



Method of freeing tank car of vapors with an MSA-Lamb Air-Mover, in which a simple sheet-metal cylinder extending through the dome deflects air into the ends of the tank.

Using an MSA explosimeter at the discharge end of the Air-Mover to detect the presence of hydrocarbon vapors. The inside of the tank is also tested with the same instrument.

THE job of clearing tank cars of vapors after transporting gasoline or liquefied petroleum gas has been cut from 16 hr. to one hour by the Lone Star Gas Company at Ranger, Tex., using a compressed-air type ventilating device on the bottom outlet and a simple air deflector supported in the dome of the car, as shown in the diagram. The reduction both of man-hours and car tieup time for inspection and repairs yields substantial savings; safety is said to be increased; there is less interruption to cleaning and repair operations; workmen are not subjected to the discomfort of high working temperatures produced by steam; in fact, the air flow has a cooling effect.

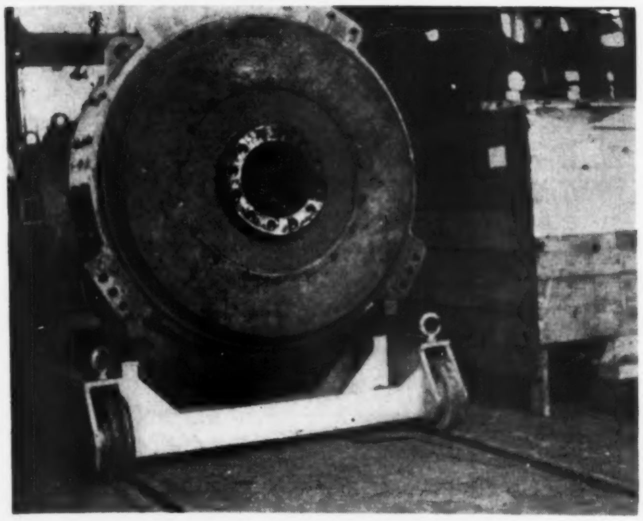
Special equipment used in this air-cleaning operation includes a 3-in. MSA-Lamb Air-Mover and a Model 2 Explosimeter, both furnished by the Mines Safety Appliances Company, Pittsburgh. The suction end of the Air-Mover is connected through an adapter to the bottom utlet of a tank car and is aimed in the direction of wind movement if there is any. Air is drawn into the tank through the top dome opening, but without means of directing air flow it tends to channel through the tank without picking up all vapors in the ends.

To overcome this limitation various types of shop-made air deflectors were tried, their relative effectiveness being checked by means of the Explosimeter at regular time intervals. The deflector which finally proved satisfactory is a 14½-in. diameter sheet-metal cylinder 41 in. long with 17½-in. diameter supporting flange on top to rest on the dome opening. The bottom end is closed and two 3-in. by 8-in. openings on opposite sides of the cylinder wall direct entering air toward opposite ends of the tank.

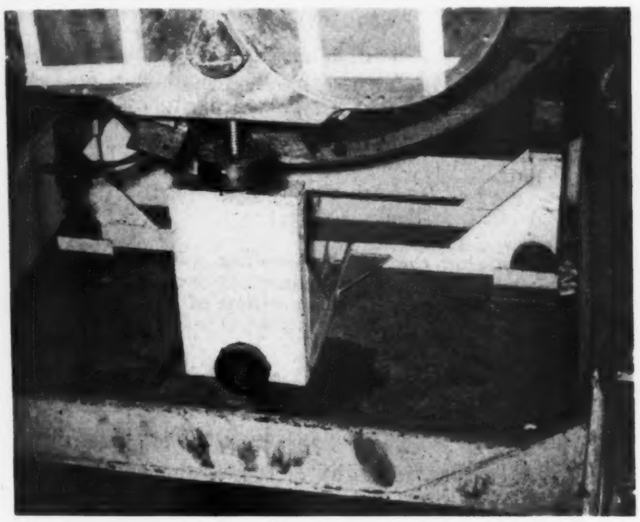
For most effective results, an air pressure of 80 lb. is supplied to the Air-Mover by an air compressor. This moves 660 cu. ft. of air per min. and consumes 72 cu. ft. per min. of compressed air. However, the device is also used successfully at pressures as low as 40 lb., which induces 460 cu. ft. of air per min. and uses 33 cu. ft. per min. of compressed air.

After 20 min. of operation in this pressure range, and at 5-min. intervals thereafter, the MSA Explosimeter is used at the discharge end of the Air-Mover to detect the presence of hydrocarbon vapors until a zero reading is obtained. Usually 30 min. of operation is enough for an 8,000-gal. tank car. The instrument is then used inside the tank. Although traces of gas are rarely found, if detected, the deflector is replaced and ventilation resumed. Sometimes scale holds vapors and must be removed, especially if welding or other hot work is necessary.

Before exhausting hydrocarbon vapors from tanks, the Lone Star Gas Company's experience shows that no liquid petroleum products should be left in a tank when starting to remove vapors. If any liquid remains after draining, it is flushed out with water to assure effective use of the Air-Mover. Another safety precaution is grounding the horn of the Air-Mover during its use to prevent possible accumulation of generated static electricity. This is usually done by connection with the railroad rail as illustrated.



Diesel locomotive generator mounted on the shop dolly.



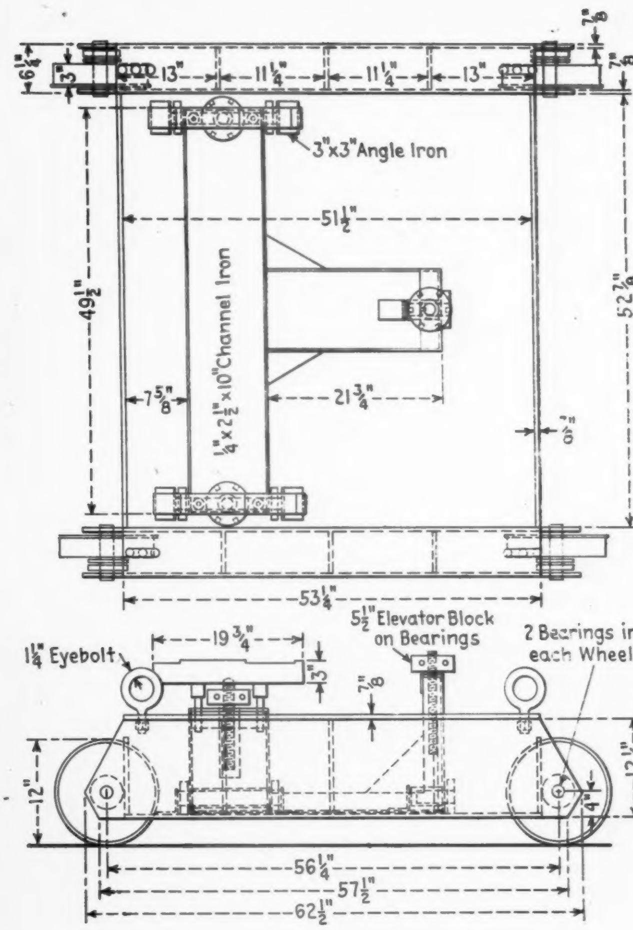
The three-point support with both vertical and tranverse adjustment.

Generator Dolly

A generator dolly is used to transport Alco generators from the repair bay to the engine build-up section and also in applying the generator to the engine block, being constructed so as to move on standard gage tracks. The generator is set on the dolly with three-point support which can be adjusted by elevator blocks and moved sidewise for lateral adjustment.

The dolly is an improvement over the former method which required the use of an overhead crane, a two-hook cable and a "come along" on a cable. The dolly eliminates the possibility of having to wait for the crane and monopolizing the crane for long periods of time. When the crane is used, much time is consumed trying to line up the holes in the generator with the dowels in the engine block; also when the generator was suspended by the crane, there was a possibility that the frame of the generator might be distorted due to its heavy weight. By using the dolly, the relative height of the generator can be varied from 3 points by using a bar and turning the elevator blocks.

There is little difference in the amount of time saved



General arrangement of the diesel generator shop dolly.

by either of the two methods, but with the dolly the crane is not required. Therefore, about 30 min. of crane time is saved for each generator application. In shops where cranes are not available in the engine build-up section, the dolly avoids the necessity of moving engines to a repair bay which is crane-equipped.

This simple holder for diesel cylinders developed by the Frisco at Springfield permits turning out one stud without bending others when a bar or 2-by-4 is used to keep liner from turning.

Questions and Answers

Diesel-Electric Locomotives*

ENGINE TEMPERATURE SWITCH (ETS) OPERATION (*Continued*)

750-Q.—What is the resulting action when and if this point is reached?
A.—A cam opens the bottom contact to de-energize the motor and prevent any further attempt to continue motor rotation.

751-Q.—What would be the result of continued motor rotation?
A.—Continued motor rotation would overload the motor and would not produce any more rheostat movement.

752-Q.—What action takes place if continued radiator fan operation cools the engine water?
A.—The temperature sensitive fluid in the bulb and bellows will contract.

753-Q.—What then happens?
A.—The pressure against the bellows piston which was originally caused by expansion of the fluid in the bulb, will be relieved as the fluid contracts.

754-Q.—What movement takes place as the pressure against the piston is relieved?
A.—The piston will slowly retract, and the movable contact will meet another stationary contact which will connect a circuit to a second motor field and the motor armature.

755-Q.—What is the result when the second motor field is energized?
A.—The fan motor will reverse its direction of rotation.

756-Q.—What effect does this reverse rotation have?
A.—Resistance in the clutch field will begin to increase, and thus slow down the radiator fan.

757-Q.—How does the second heating element function?
A.—The second heating element will cause a bi-metallic strip to force the movable contact away from the stationary contact before bellows action would normally do so.

758-Q.—What is the ultimate result of this movement?
A.—The contacts are separated before the eddy current clutch field is completely de-energized and radiator fan operation is maintained at a reduced speed.

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

759-Q.—What is the operation if the water cools to a temperature at which no further cooling action is needed?
A.—The movable contact will again meet the stationary contact to energize the motor field. The rheostat will run in all available clutch field resistance.

760-Q.—What happens as the rheostat reaches the position of maximum resistance?
A.—The cams close the middle contact to energize the "SMV" and close the shutters, open the top contact to de-energize the rheostat motor and prevent further rotation.

761-Q.—How is the field half of the coupling affected?
A.—With maximum resistance in the clutch field circuit, the field half of the coupling will no longer be attracted to the engine driven half and fan rotation will end.

CIRCUIT ANALYSIS

762-Q.—Assuming that engine cooling water temperature is rising but has not yet become hot enough for cooling to take place, what is the position of the shutters?
A.—The shutters are closed.

763-Q.—What flow of current serves to keep the shutters closed?
A.—Referring to Fig. 2, Contact *12* is closed, permitting current from wire *71* to pass through to *SMV*.

764-Q.—What is the position of the motor driven rheostat at this time?
A.—The rheostat is in maximum resistance position and not enough current is flowing to the clutch field to cause fan operation.

765-Q.—What takes place when engine cooling water temperature reaches 155 deg.?
A.—The expanding temperature sensitive fluid in the bellows forces movable contact *TC* to leave stationary contact *J* and meet stationary contact *C* as shown on Fig. 3.

766-Q.—What is the resulting current flow?
A.—When "*TC*" meets "*C*" it passes current through contact *13* to heating element "*H2*," motor field "*R*" and the motor armature *M*.

767-Q.—What mechanical action follows?
A.—The motor begins to turn the rheostat.

768-Q.—How is the resistance of the rheostat affected?
A.—The resistance of the rheostat now decreases.

769-Q.—What happens as the resistance of the rheostat decreases?
A.—As the resistance decreases, current flows through the rheostat from wire *71* to wire *72* and then to the clutch field.

770-Q.—What action takes place when current flows to the clutch field?

A.—The fan now begins to rotate.

771-Q.—What additional movement takes place as the rheostat begins to turn?

A.—As the rheostat begins to turn, its extension shaft turns a cam which opens contact *12*.

772-Q.—What happens when this contact is opened?

A.—*SMV* is de-energized and the shutters open.

773-Q.—As previously stated, when *TC* meets *C* current passes to heating element *H2*. What then takes place.

A.—Passage of current through *H2* causes it to become red hot.

774-Q.What then happens?

A.—The heat causes a bi-metal strip to bend and exert pressure against *TC* tending to move that contact away from *C* to open the motor circuit.

Schedule 24 RL Air Brakes

(Speed-Governor Control (*Continued*)

1520-Q.—What results from the opening of this contact?

A.—Opening of contact *A6-A8* removes generator current from relay *1*, thus reducing the load on the generator and preventing over-energization of relay *1*.

1521-Q.—What contacts are affected when relay *5* is operated at a speed of approximately 8 m.p.h?

A.—Contacts *A3-A1* and *B6-B8* become closed.

1522-Q.—Describe the current flow with contact *B6-B8* closed.

A.—Current will flow from the positive side of the battery, terminal *37*, contact *B6-B8* to indicating lamp *20* and through terminal *38* to the negative side of the battery.

1523-Q.—What is the function of indicating lamp *20*?

A.—This lamp serves to indicate that the generator is functioning as intended.

1524-Q.—Describe the current flow with contact *A3-A1* closed.

A.—With this contact closed, and it being assumed that the *K3* switch is closed, battery current will flow from terminal *45* through contact *A3-A1*, resistor *9*, the lower coil of relay *6*, contact *A2-A1* of relay *6M* and terminal *38* to the negative side of the battery.

1525-Q.—What position does relay *6* now assume?

A.—Relay *6* assumes the energized position.

1526-Q.—What flow of current results?

A.—With contact *A4-A3* of relay *6* closed, battery current will flow from terminal *45* through this contact and contact *B3-B4* of relay *6M* to the low speed magnet *L* of the F.S.1864 relay valve.

1527-Q.—With the current flowing to the low speed magnet *L* of the relay valve what happens?

A.—This provides for the development of 40 per cent maximum braking pressure.

1528-Q.—What current is also supplied with relay *5* energized from the generator?

A.—Battery current is also supplied through contact *A3-A1* of relay *5*, the lower coil of relay *5*, resistor *12*, contact *B6-B5* of relay *6*, contact *A2-A1* of relay *6M* and terminal *38* to the negative side of the battery.

1529-Q.—What is the purpose of the action just described?

A.—This serves to maintain the relay *5* contacts closed in their upper position at extremely low speeds where the decrease in generator voltage would otherwise allow this relay to drop out.

1530-Q.—How is the low speed magnet *L* affected?

A.—By this means the low speed magnet *L* of the F.S.1864 relay valve is maintained energized from 20 m.p.h. down to a complete stop or until the *K3* switch is opened.

1531-Q.—What functions to open the *K3* switch?

A.—A release of the brakes.

1532-Q.—In case the brakes are applied while the vehicle is standing, what per cent braking pressure will be obtained?

A.—60 per cent braking pressure.

1533-Q.—What develops when a speed of 22 m.p.h. is reached?

A.—The generator current developed is sufficient to operate relay *2L* to the energized position and its contact *B2-B3* then becomes closed.

1534-Q.—What results from the closing of this contact?

A.—A short circuit is placed around relay *6*, which therefore drops to the de-energized position.

1535-Q.—What is the function of resistor *9*?

A.—This resistor limits the flow of current from the battery to the desired amount.

1536-Q.—What happens when relay *6* assumes the de-energized position?

A.—Its contacts assume the lower position.

1537-Q.—What is the action when contact *A4-A3* opens?

A.—Opening of this contact de-energizes the low speed magnet *L* of the F.S.1864 relay valve, thus providing 60 per cent of maximum braking pressure.

1538-Q.—What does opening of contact *B4-B3* accomplish?

A.—Opening of this contact removes the short circuit around a portion of resistor *8L*.

1539-Q.—What is the result of this action?

A.—This increases the amount of resistance in series with relay *2L*.

ELECTRICAL SECTION

The seven new locomotives outside the Niagara Junction Railway engine house

Electric Locomotives for Niagara Junction's Expanding Traffic

Seven new units, aided by a radio communication system, now handle nearly all of the railroad's greatly expanded business

By W. A. Bailey
Locomotive and Car Equipment Department
General Electric Company

THE delivery last summer of seven electric locomotives to the Niagara Junction Railway was the latest step in a history of 60 years of progress since the organization of the company on June 3, 1892.

By 1913, it had become evident that the two steam locomotives owned by the railroad were inadequate to handle the traffic, and electrification of the railroad at 600 volts d.c., using the overhead catenary system, was decided upon. Two 60-ton electric locomotives were pur-

Heavy tonnage is interchanged daily with connecting trunk line railroads at Foote Yards

Two-way radio communication boosts speed and efficiency of operation

chased to replace the steamers, and complete electric operation was begun. These two locomotives were in daily operation until last fall.

The years following electrification were marked by continued expansion of the railroad and growth in its traffic. Trackage, including main line and industrial sidings, increased from approximately 9 miles in 1896 to more than 40 miles today. Existing industries expanded and new plants came into being, increasing the total number of industries on this railroad to 27. The traffic handled in 1951 was 575 per cent above that handled in 1905. During the years following 1913, new and used electric locomotives were purchased and leased. These ultimately brought the motive power roster to a total of 10 locomotives.

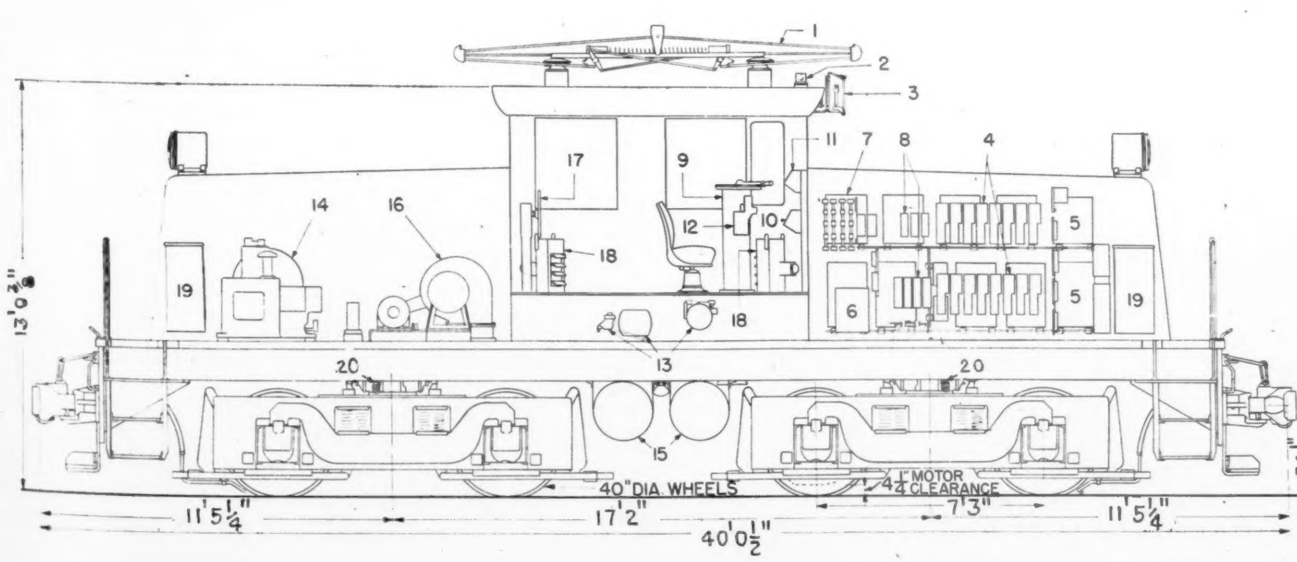
In January 1948, the road changed ownership by sale of the capital stock to the New York Central, Erie, and Lehigh Valley railroads. However, it continued to operate as a separate entity, with continually expanding and improved service as its goal. Today it maintains direct or indirect interchange of traffic with the New York Central, Erie, Lehigh Valley, Canadian National, Chesapeake and Ohio, Wabash, and Grand Trunk railroads.

Table I—Principal Locomotive Dimensions

Length inside knuckles	40 ft. 0½ in.
Width overall	10 ft. 0 in.
Height over pantograph locked down	15 ft. 0 in.
Maximum height, pantograph extended	23 ft. 4 in.
Coupler height above rail	34½ in.
Rail clearance under gear case	4¼ in.
Track gage	56½ in.
Truck wheel base	7 ft. 3 in.
Distance between truck centers	17 ft. 2 in.
Wheel diameter	40 in.
Minimum radius curve (locomotive alone)	100 ft.

New Motive Power

The seven new General Electric locomotives were intended to replace the road's previous motive power. At present, they handle practically all the business of the road, which consists exclusively of freight switching and transfer work, and operate over maximum grades of 1 per cent. Some of the older locomotives are being held in reserve for unusual peaks of traffic, and others are being sold.



Outline of Locomotive showing location of principal pieces of equipment

1. Pantograph trolley
2. Lighting Arrester
3. Main fuse box
4. Main contactors
5. Accelerating resistors
6. Reverser
7. Motor cutout switches
8. Auxiliary contactors
9. Master controller
10. Instrument panel
11. Indicating lights
12. Brake valve
13. Air Brake equipment
14. Air compressor
15. Main air reservoirs
16. Traction motor blower
17. Hand brake
18. Cab heaters
19. Sand boxes
20. Warning lights

The new locomotives are of the steeple cab type with a central engineman's cab. An apparatus compartment at either end extends to the end of the locomotive platform. They weigh 96 tons each, all on driving wheels, and have a length of 40 ft. over couplers.

Running Gear

The running gear consists of two two-axle swivel trucks. Truck frames are of welded construction, being fabricated of steel plate throughout. These frames are supported on the equalizers by helical springs. All axle journals are fitted with American Transit Association type bearing linings, and have thrust blocks in the journal boxes to limit the endplay of the axles. The rolled steel wheels are 40 in. in diameter.

Clasp brakes are used, and the brake rigging is designed to give a total braking pressure of approximately 60 per cent of the weight on drivers with 50 lb. per sq. in. cylinder pressure.

Two I-beams from the main center sills of the locomotive platform, which consists of a solid slab of steel 36 ft. long, 10 ft. wide and 3¼ in. thick. The space between the I-beams is used for the ventilating duct which conveys air to the traction motors. The side channels, end plates, deck plate, and bolsters are securely welded together and to the I-beam to form the underframe. Type-E top operated couplers are bolted to each end of the locomotive platform.

Apparatus Arrangement

The apparatus compartment at the No. 1 end of the locomotive houses the high voltage equipment and is divided into two sections. The one on the *A* side houses the motor cutout switches, high voltage fuses, and other pieces of control equipment. The section on the B side contains the accelerating resistors. Hinged doors on both sides of the locomotive provide access to this equipment. There are no louvers in the doors of the No. 1 end compartment. The accelerating resistors are cooled by convection; air being taken in through holes in the platform under the resistors and escaping through a raised hatch above the resistors.

Located in the No. 2 end apparatus compartment are the air compressor and the motor driven traction motor blower. This compartment has doors on both sides for easy access to the equipment. Louvers are built into the doors for air inlet.

The engineman's cab is in the center of the locomotive. It is fitted with two operating positions, each with a complete set of electric controls, air brake valves and instruments. This feature permits operation in either direction with equal facility—a decided advantage in switching service. Care was used in designing the engineman's cab to insure maximum visibility in all directions. The total window area is unusually large, amounting to approximately 45 sq. ft. Also large mirrors on each side of the cab give the engineman a view along the side of the train opposite to where he is seated.

The air brake equipment is Schedule 14-El. A two-stage air compressor with a capacity of 120 cu. ft. per min. is driven by a 600-volt motor operated directly from the trolley. Approximately 60,000 cu. in. of air reservoir capacity is provided.

Current is collected from the overhead wire by a single shoe, spring-raised, air-lowered pantograph trolley mounted on the roof of the engineman's cab.

The control is of the electro-pneumatic type arranged to give two motor combinations, and is operated directly from the trolley. For low speed, all four motors are connected in series. For high speed, they are connected two in series and two groups in parallel. The master controller provides 11 accelerating steps and one running position in the low-speed range and 8 accelerating steps and one running position in the high-speed range.

Traction circuit protection is furnished by differential relays and a main fuse. The differential relays have indicating lights to show which one has tripped and enable the proper motor circuit to be cutout. Auxiliary circuits are protected by a circuit breaker and fuses.

Wheel-slip indication is given in the engineman's cab by means of a pair of voltage relays, each connected to measure voltage differential between the two traction motor armatures that always operate in series. These relays operate a light at each engineman's position and also a loud buzzer.

A weight-shift compensating device is foot-operated by push buttons near each controller. This arrangement shunts the fields of the leading motor in each truck for either direction of motion. This eliminates the effect of truck tilting and enables all axles to be worked up to full adhesion.

Each axle is driven by a type GE-731, 600-volt, d.c. railway type motor. This motor is of the conventional four-pole, series wound, axle-hung construction. It is the same design as motors in current use on diesel-electric locomotives. This was one of the customer's requirements, to provide maximum availability of spare parts. The motor is fitted with single reduction gearing. Both pinion and gear are solid, and the ratio is 75 to 16. This gives a maximum permissable locomotive speed of 60 m.p.h. However, the maximum operating speed in service is restricted to 30 m.p.h.

With 600 volts on the trolley, the locomotive has a continuous tractive force rating of 27,200 lb. at 14.2 m.p.h. and a one-hour rating of 30,000 lb. at 13.9 m.p.h. Maximum tractive force (25 per cent adhesion) is 48,000 lb.

All locomotives are equipped with two-way radio sets for communication with the dispatcher's office. The same system is also installed in automobiles of the officials. This achieves maximum efficiency in controlling the movements of all locomotives operating on the line.

Carbon Grounds Cleared in Place—Correction

In the article, "Carbon Grounds Cleared in Place", which appears on page 96 of the March 1953 issue of *Railway Locomotives and Cars*, the last sentence in the first paragraph states that a machine developed by L. E. Legg, electrical engineer, C. & N. W., apparently disintegrates carbon with damage to the equipment in clearing up a ground. This should state that it is done *without* damage to the equipment.

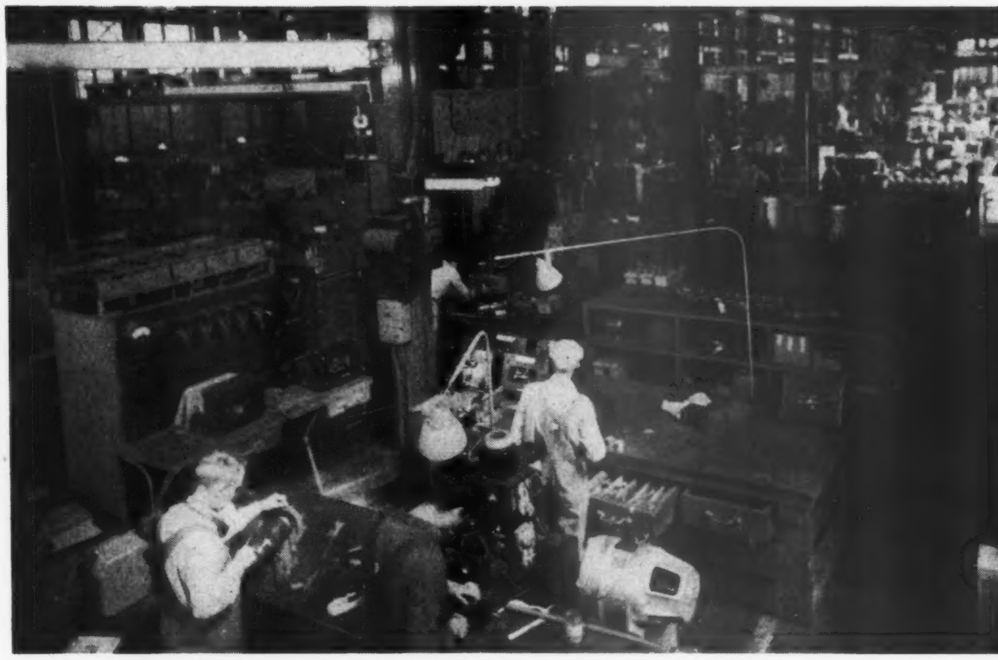


Fig. 1—General view of the new section of the shop

Santa Fe Extends Size And Scope of Its Electrical Shop

Addition at one end of the San Bernardino, Cal. shop makes provision for testing and overhauling of locomotive control and auxiliary equipment, small motors, and car lighting and air conditioning equipment

The Atchison, Topeka and Santa Fe has made additions to its electrical repair shop facilities at San Bernardino, Calif., which are designed primarily for the testing and overhaul of locomotive auxiliary equipment. In the new section, specific attention is given to locomotive auxiliary and control equipment which is apt to be

Fig. 2—General purpose test board

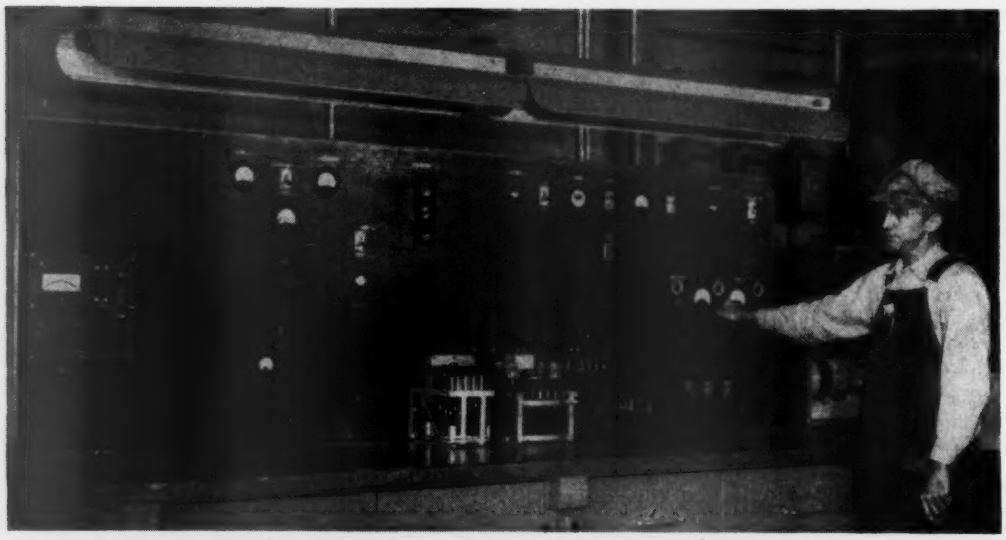


Fig. 3—Automatic train control test panel

Fig. 4 (left)—Automatic train control and train stop test stand and panel. Fig. 5 (right)—Auxiliary generator and motor test panel

subordinated to the more obvious demands of traction motors and generators.

A general view of the new section of the shop is shown in Fig. 1. The panels shown in Fig. 2 constitute a general purpose test board. It is used to test relays for all types of diesel locomotive units, the tests being made under conditions equivalent to actual operation. There are receptacles on the board which permit plugging in of relays under test. Equipment which can be tested in this manner includes Alco-G. E. excitation panels, regenerative brake control panels and motor shunting panels.

Receptacles on the test board also allow for bringing

Fig. 6 (left)—Overhaul bench for reversers, cam switches, auxiliary generators and air cylinder assemblies. Fig. 7 (right)—Voltage regulator test stand

Fig. 8 (left)—Alco-G.E. governor test stand. Fig. 9 (right)—Meter test bench

Fig. 10 (left)—Steam generator electrical equipment and repair stand. Fig. 11 (right)—Headlight test stand

various kinds of electrical power out to work being done on the bench. On the center panel is an oscilloscope for testing rectifiers and for miscellaneous purposes. Also, on the center panel is a Hickok electronic meter for measuring voltage and current including milliamperes, a.c. and d.c. ohms, capacity and decibels. Two of the panel meters are used for measuring current supplied by rectifiers.

On the left hand panel, two meters show the output from the motor-generator set which supplies current for testing. Two milliammeters—one a.c. and one d.c.—are used to measure pick up and drop-away current of relays. Lights indicate the opening and closing of the contacts of relays under test.

On the center panel, there is also an enclosed pushbutton station which starts and stops a 400-cycle generator. A rheostat is used to control the output of this generator. At the right on the center panel, there is a plug board which allows for making connections which correspond to the various connections on an Alco exciter panel. This avoids the need for applying and removing connections on the panels themselves.

The right-hand panel supplies and measures a.c. and d.c. volts and amperes and milliamperes for bench testing. It is also equipped with a standard tachometer for checking the locomotive engine r.p.m. indicator.

Equipment for testing automatic train control and train stop apparatus is shown in Figs. 3 and 4. Rails in the floor may be used to energize loop receivers either ahead of or behind a rail short circuit. Performance of receivers, known to be in good condition, is compared with that of others under test. The test panel is used to control current and voltage in the rails exactly as it is supplied in service.

The panel shown in Fig. 5 is used for testing locomotive auxiliary generators, traction motor blowers and a.c. cooling fan motors. It also includes means for making coil potential tests. For these purposes, the panel is equipped with sources of 64-volt d.c., 110-volt a.c., 3-phase power supply. The d.c. power is obtained from a 10-kw. mg. set, the d.c. voltage being controlled by a field rheostat on the panel. Power from the board to the motors under test is controlled from pushbutton stations through contactors. Jacks at the bottom of the panel provide connections for bench testing.

The bench, Fig. 6, is used for overhauling reversers, cam switches, auxiliary generators and air cylinder assemblies. Worn rotor segments of reversers and cam switches

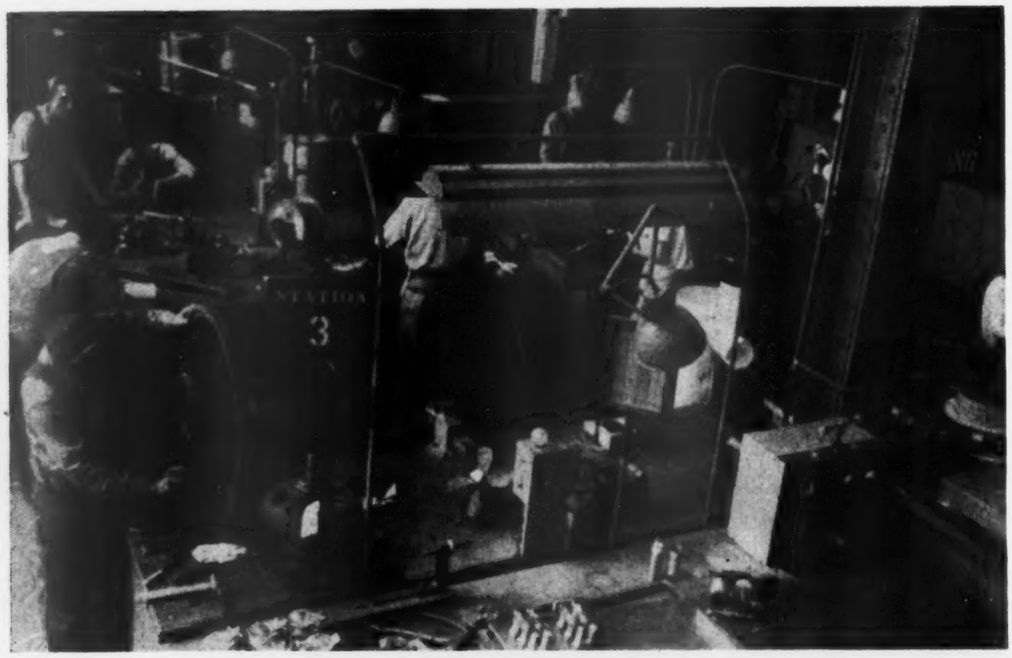


Fig. 12—Small motors repair section

Fig. 13—Car lighting and air conditioning repair facilities

are built up by means of gas welding reassembled and machined to original dimensions.

The voltage regulator test stand, Fig. 7, is used to test and overhaul General Electric, Electro-Motive and Westinghouse low-voltage regulators. They are tested under the full range of voltage and current found in service. All mechanical and electrical repairs are made on the bench.

In Fig. 8 is shown an Alco-G. E. governor test stand. It simulates operating conditions and is used to measure pilot valve current values, engine speed, generator excitation and resistance of rheostats and coils. Governors are completely dismantled, worn parts are replaced and the governors re-assembled and tested.

The test bench shown in Fig. 9 is used for testing and calibrating meters of all kinds. The panel is supplied with 1,000-volt d.c. power from an m.g. set. For the making of measurements with d.c., a 100-volt rectifier and veritram are used. A battery with a rheostat control supplies voltage in millivolts. All tests made compare the behavior of meters under test with calibrated meters.

Locomotive steam-generator electrical equipment is tested and repaired on the bench shown in Fig. 10. It is used for overhauling and testing of 5-hp. motor converters, 5- and 7½-hp. water pump motors and rotary converters which supply a.c. current for the ignition transformer and stack switches under test, with a thermostat for check. The bench is also used for overhauling out-fire relays and blow-down switches. It requires 72-volt, d.c. power which is obtained from an m.g. set. A rheostat on the panel controls the d.c. voltage. An eddy current brake is used to load the motors under test.

Oscillating headlights are tested on the stand shown in Fig. 11. The procedure consists of disassembling, replacing worn bearings and parts, cleaning, rewiring, assembling and adjusting. The stand is equipped with power supply and switches to permit of operation corresponding to that on a locomotive.

Also included in the shop expansion is the small motors repair section, shown in Fig. 12, and the new facilities for overhauling car lighting and air conditioning equipment, shown in Fig. 13.

DIESEL-ELECTRICS—How to Keep 'Em Rolling

17 Engine Control

A few simple checks for your control gear which will prevent locomotive road failures

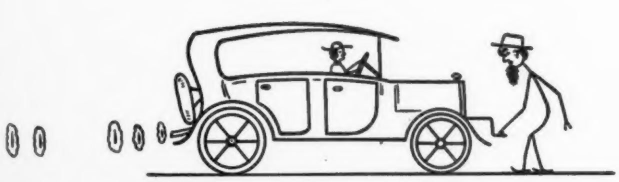


Fig. 1—Engine cranking

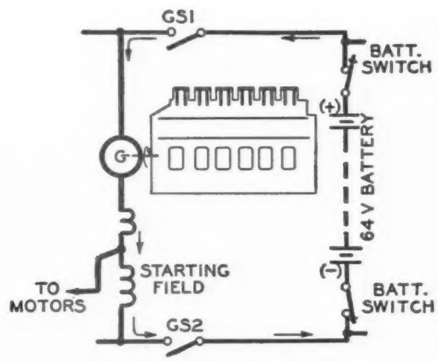


Fig. 2—Engine cranking circuit

If you've ever had your car stall in traffic, you know how embarrassing it is. Remember how the horns blared while you tried to get going? If you're lucky enough to be an auto mechanic you probably were rolling again in a jiffy. Otherwise, you most likely ran the battery down and then waited for a tow car.

An auto stalled in the street doesn't stop traffic. A locomotive stalled on the main line does. In the haste to get a locomotive engine started, the batteries are often run down needlessly. Then a long train delay results. Many times this could be prevented if a little more were known about what shuts the engine down, what starts it up, and what keeps it running. In this article, we'll look at some of these things.

Engine Cranking

Perhaps you remember the hand crank on the early autos. It took a good husky man to start one of those cars. The automobile of today was made possible by the invention of the electric starter. Now, instead of going around in front to crank the engine, you just press the starter button. This connects the starting motor to the battery. The pinion on the motor shaft meshes with the flywheel and turns the engine over. When you release the button, current is cut off from the starting motor and it disengages the flywheel.

The diesel engine on a locomotive is started in much the same way. This works out very well on a diesel-electric locomotive because the main generator can be used as a starting motor. As we've already learned, if current is supplied to a d.c. generator it can be used as a motor. So, we feed battery current into the main generator to crank the engine. While the circuits in Fig. 2 show how this is done on Alco-G.E. locomotives, the principles apply to the other makes as well. The locomotive battery is connected to the main generator with the starting contactors marked *GS1* and *GS2*. When these close, current flows through the generator in the direction shown by the arrows. This causes it to run as a motor and crank the engine. After the engine has started, the starting contactors are dropped out. This disconnects the generator from the battery.

The Starting Circuits

Now let's see what makes the starting contactors operate. In Fig. 3, you see a sketch of the starting contactor coil circuits. We learned in a previous article that the *71* wire is hot when the battery switch, battery circuit breaker, both fuel pump breakers and the fuel pump contactor are closed. Suppose this has been done and the *71* wire is hot. To start the engine, you turn the engine control *EC* knob to the *IDLE* position (See Fig. 4). Then you turn the start lever to the *start* position. This causes current to flow through the contactor coils. These are magnetic contactors, so current flowing through the coils will cause them to pick up. When you release the start lever the current flow to the coils stops and the contactors drop out.

This is the seventeenth of a series of articles on the maintenance of diesel-electric equipment. This article is written by B. L. Judy and A. V. Johansson, Locomotive and Car Equipmentt Department, General Electric Company, Erie, Pa.

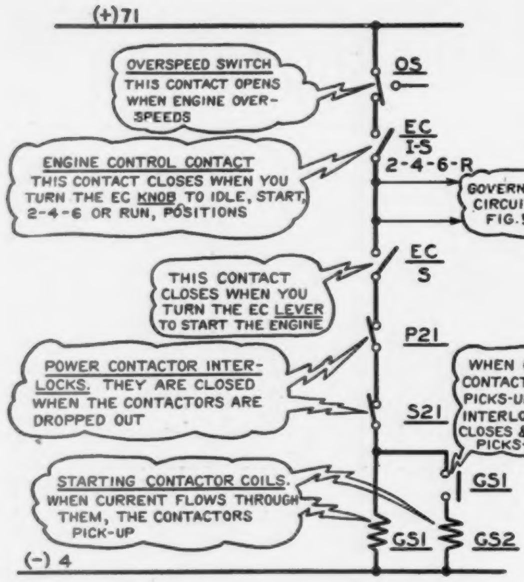


Fig. 3—Starting contactor coil circuits

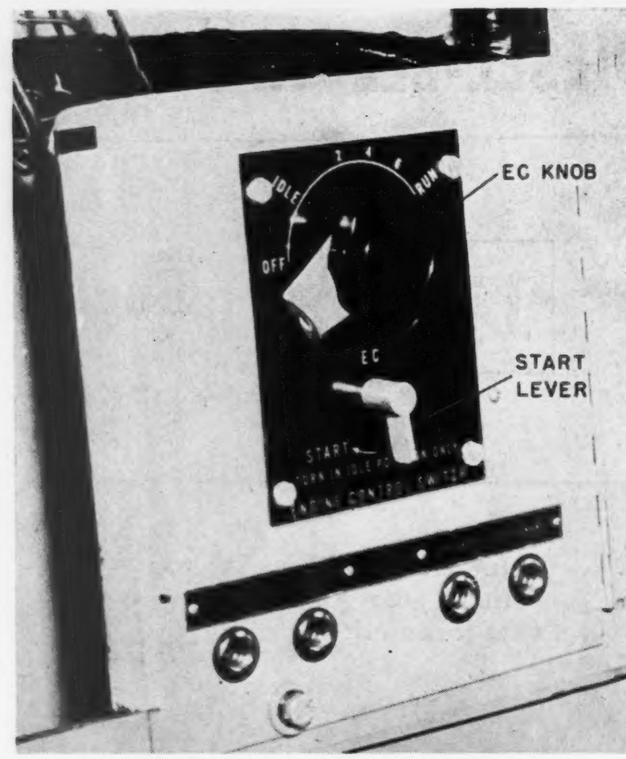


Fig. 4—Engine control switch mounted on contactor wall

Here are some of the things to look for when you can't crank the engine. See that *GS1* and *GS2* contactors pick up. If they do, then see that their tips are not dirty or fouled up. If the tips are okay, look at the traction generator and see that the brushes are in place.

A look at the circuit in Fig. 3 will show some of the things that can keep the starting contactors from picking up. If the overspeed switch (*OS*) has tripped, you have to reset it before current can flow to the contactor coils.

An insulating film may have formed on the *EC* contacts. You may be able to rub through this film by turning the *EC* knob and the engine start lever a few times.

Take a look at the *P21* and *S21* interlocks. They are on the main contactors in the control compartment. Maybe they were bent or fouled up the last time someone was working in the control compartment.

If the starting contactor GS1 picks up but *GS2* does not, you know that the trouble is in the branch circuit to GS2 coil. You will likely find the GS1 interlock dirty or bent.

Weak or dead batteries will prevent the starting contactors from picking up. You can spot a run-down battery by the dimming engine room lights when you turn on the fuel pump motor.

If you use the starting contactors to jack the engine over, you will likely end up with welded contact tips. Each time you operate the *EC* start lever the contactors must interrupt the heavy starting current. This produces an arc which makes the tips very hot. If there is molten copper on the tips when they reclose, they will stick or weld together. When this happens the engine will not load up.

The Governor Takes Over

Cranking is only the first part of the engine starting story. At the same time as you crank the engine, you must also give it fuel. This means that the governor has to be coupled to the fuel racks. You will recall the two clutch arms in the governor that are used to make this coupling.

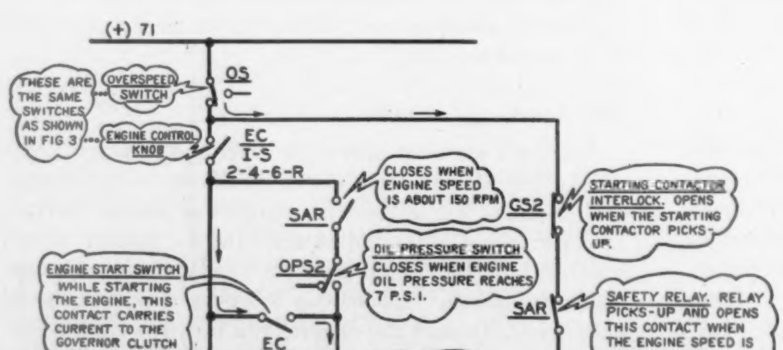


Fig. 5—Governor clutch coil circuits.

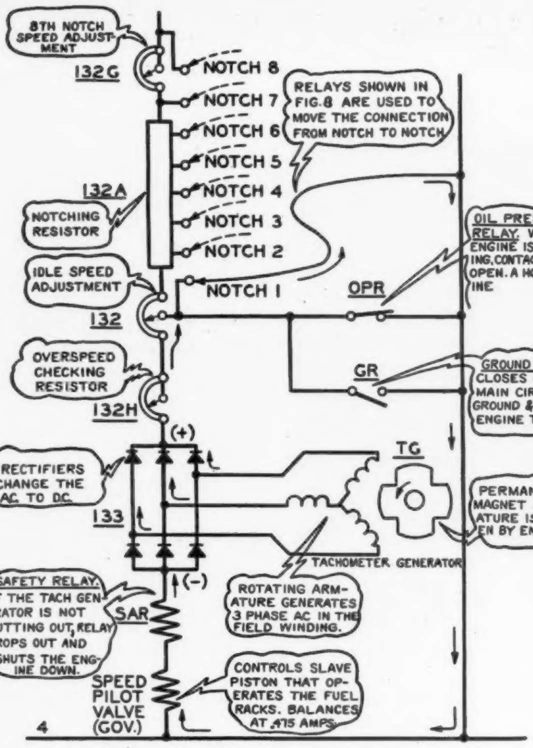


Fig. 6—Notching resistor circuits

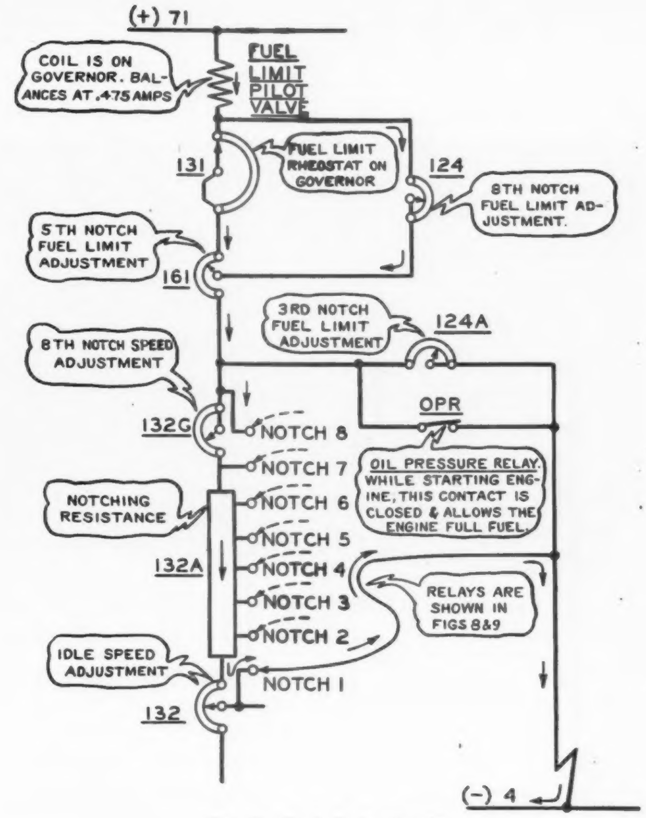


Fig. 7—Fuel limit circuits

Figure 5 shows the circuits used to automatically couple the governor to the racks. The job they do is like setting a rat-trap without getting your fingers near the trap.

When you turn on the fuel pump, you make the *71* wire hot, and current flows through the stabilizing coil of the speed pilot valve. This path is shown on the right of the circuit in Fig. 5. Current through this coil pulls the speed plot valve plunger down. The slave piston then moves and forces the arms together. This is like pulling the trap spring back. Now to set the trigger.

When you turned the engine start lever to pick up the starting contactors, you also closed a second finger which feeds current to the governor clutch coil. This is the middle circuit in Fig. 5. Current through the clutch coil magnetizes the clutch arms so that they stick together. That's like putting the trigger of the trap in place. Now to let go of the trap.

The starting contactor interlock *GS2* in the right hand circuit of Fig. 5 opens when the starting contactor picks up. It cuts off current to the stabilizing coil, allowing the speed pilot valve to return to the normal position. This removes the force that brought the arms together. However, when the engine start lever is released, *GS2* will drop out. This would close the circuit again. Below *GS2* in the circuit is a contact marked *SAR*. When the engine gets up to about 150 r.p.m. this contact opens, as we'll see later. This keeps the circuit open after you release the engine start lever. The clutch coil is now holding the arms together—the trap is set!

While the engine is being cranked, current flows to the clutch coil through the engine start contact. A second path must be provided before you release the engine start lever. Otherwise the current to the clutch coil will be cut off and the clutch arms will trip. This second path for the clutch coil current is shown in the middle circuit in Fig. 5. When the engine speed gets up to 150 r.p.m., the *SAR* contact in this circuit will close. When the engine lube oil pressure reaches seven lb. per sq. in., *OPS2* will close and the low lube oil light will go out. After the low lube oil light goes out, the engine start lever can be released, and the engine will continue to run.

Maybe this sounds a bit complicated. Actually, all you do is start the fuel pump, turn the engine start lever to "start," and release it when the engine starts.

You may ask, why bother with the clutch coil? The answer is, engine protection. You can get this either by mechanical trips or electrically. If you trace the current flow from the *71* wire through the clutch coil to the 4 wire when the engine is running, you will find four protective switches in the circuit. Operation of any one of them will kill the clutch coil. This springs the rat trap, and the clutch arms fly apart. When they do they disconnect the governor from the engine and move the fuel racks to the off position. This forms an electrical trip for the engine protection.

When the governor is acting up, here are some things to look for on the clutch coils. If the clutch arms won't close, push the speed pilot valve down with your finger. If they still don't close, the trouble is in the oil system or the governor pistons. If the arms close when you push the valve with your finger, there is an "open" in the stabilizing coil circuit, Fig. 5.

If the clutch arms close but won't hold together, the trouble is in the clutch coil circuit. If they trip as soon as you turn the start lever to *start*, check the *EC start* contact, the governor clutch coil and the engine stop relay, *ESR*, contact. If any one of these is open the clutch arms will not hold. If *GS2* picks up too fast, it will open the stabilizing coil circuit before the clutch coil has had time to catch. If you suspect this is happening, take

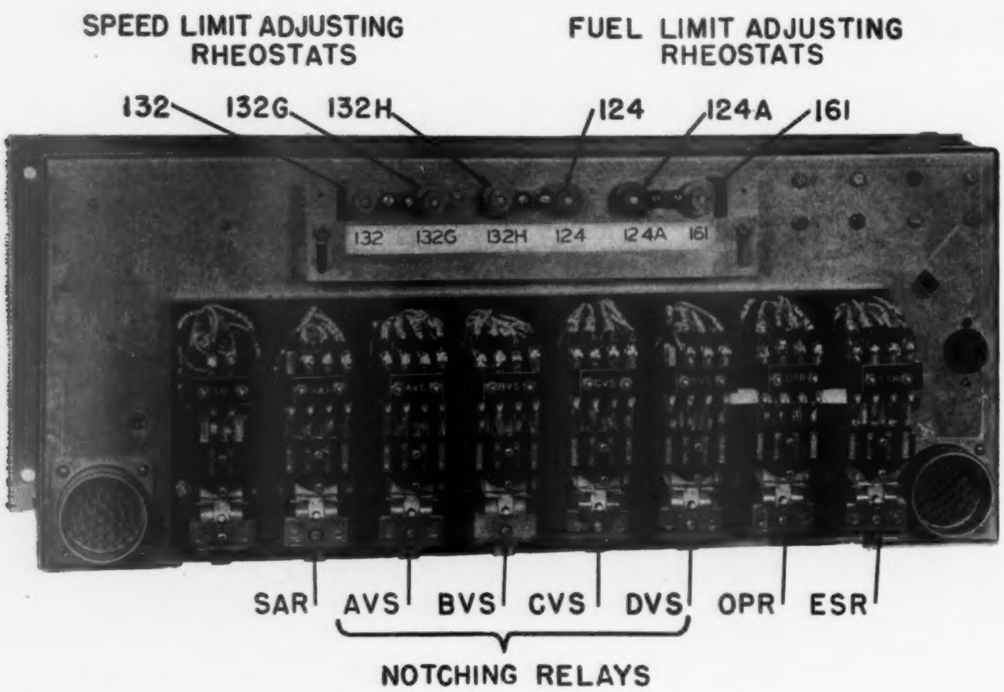


Fig. 8—Notching relays and rheostat adjustments

a look at the armature springs on the starting contactors. Loose or missing springs will cause this trouble.

If the clutch drops out when you release the start lever, check the *SAR* and the *OPS2* switch contacts to see that they make contact when the engine is cranked.

Engine Speed Control

As soon as the engine starts, the governor must take control of the engine speed. We have learned that it does this by controlling the fuel fed to the engine and also the engine load. As you recall, the tach generator voltage acting on the speed pilot valve coil causes the governor to do this.

To see how it works, let's start out with the tach generator, Fig. 6. It supplies the voltage for this circuit. This voltage represents engine speed. There is a receptacle on the engine control panel that connects to the tach generator. A test meter which reads engine speed can be plugged into this receptacle.

The tach generator output is changed to d.c. by the three-phase rectifier bank. The circuit is quite simple if you think of the rectifier bank as a battery. Suppose that the top connection is positive and the bottom is negative, as marked on the sketch. Now you have a simple resistor and coil circuit with current flowing as shown by the arrows.

Whenever the engine is running, the tach generator and the speed pilot valve are playing a game of cat and mouse. The tach generator (engine speed) is always trying to change. The speed pilot valve is always busy keeping it in line by changing the engine fuel and load.

The heart of the speed pilot valve is the speed coil. With 0.475 amp. (balancing current) flowing through the speed coil, there is no action. An increase in the speed coil current causes the pilot valve to act to reduce engine speed. A decrease in speed coil current causes the pilot valve to act to increase engine speed. So we have a self-regulating system that tries to keep coil current at 0.475 amps at all times.

Now let's see what can be done to this system to set the engine speeds. Suppose you move the lead with the arrow head from notch *1* up to notch *2* on the notching resistor, Fig. 6. This cuts the resistance between notch *1* and notch *2* into the circuit. The added resistance reduces the speed coil current. As a result the speed pilot valve acts to increase engine speed. The engine speeds up until the tach generator voltage gets high enough to bring the speed coil current back to 0.475 amps. This new tach generator output corresponds to a new speed setting. If the lead to the notching resistor is moved

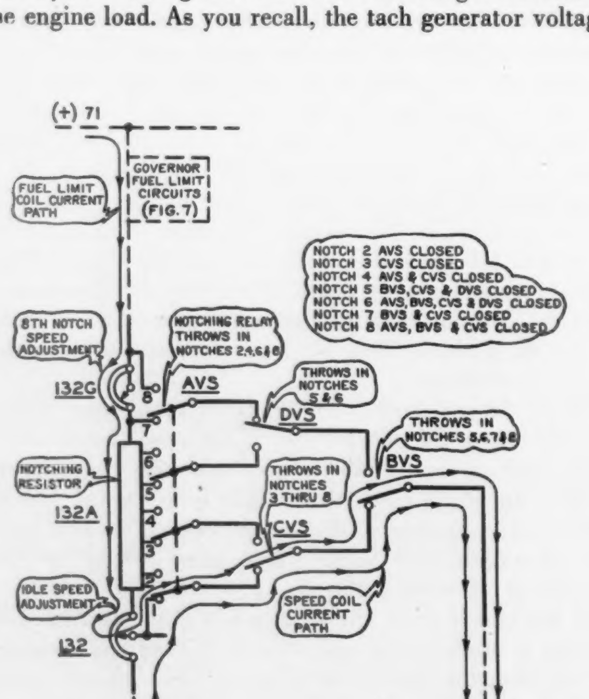


Fig. 9—Combined speed control and fuel limit circuits

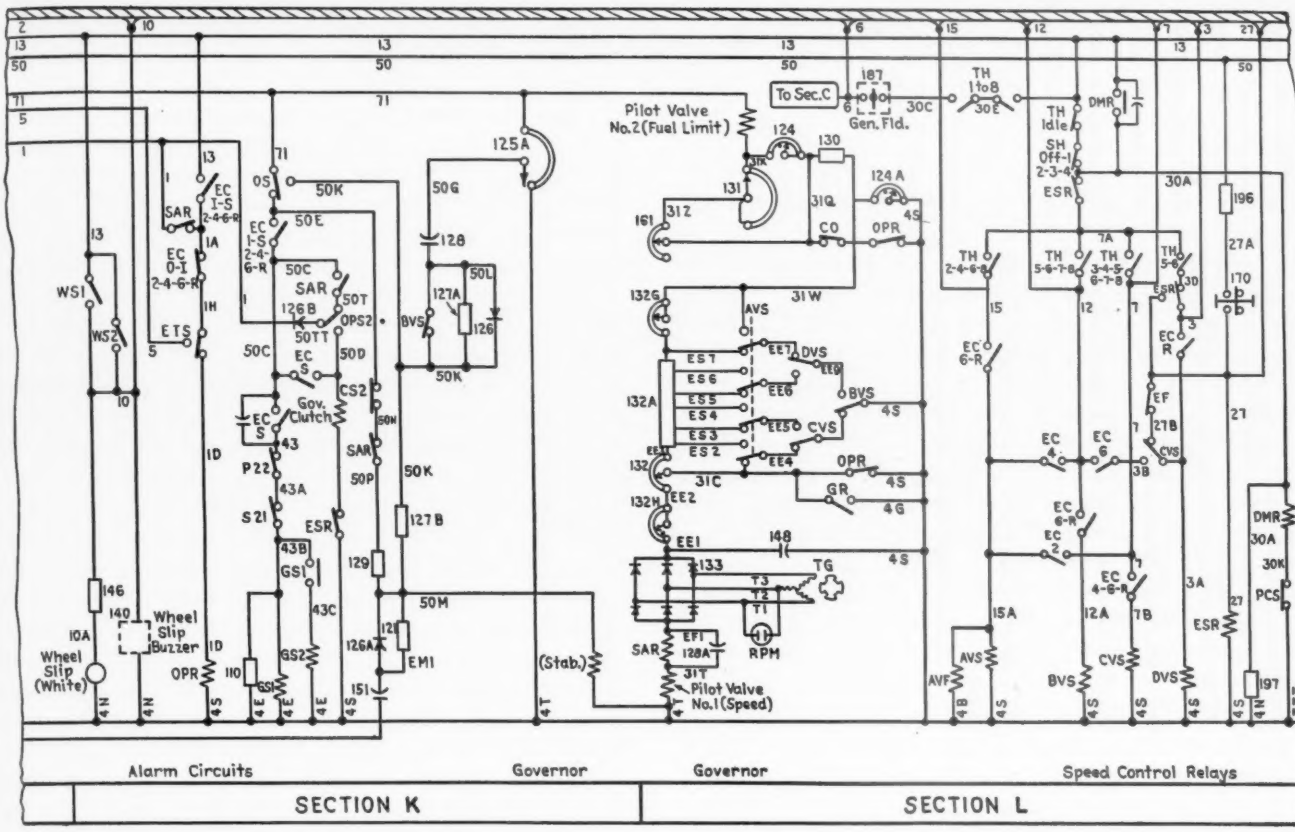


Fig. 10—Section of schematic diagram showing circuits discussed in this article

from a high notch to a lower notch, this all happens in reverse. A little later we will see how the lead is automatically moved from notch to notch by throttle movement.

By looking at the circuit, you will see how the adjustable resistors are used to set *IDLE* and notch *8* speeds. There is no adjustment for speeds between idle and 8th notches. However, the *132A* resistor steps are the right size to give the correct steps of speed if idle and 8th notch speeds are set correctly, and if speed coil balancing current is correct.

You can also see that the speed setting resistance will be returned to idle when *OPR* drops out. This serves to prevent damage which might be caused by high-speed operation when you have a hot engine. If the lube oil pressure gets too low *OPS2* (Fig. 5) will operate and shut the engine down. The *GR* relay contact also returns the engine to idle. When this relay trips, it has to be reset by hand. If you can't get the engine speed above idle, check the ground relay—it may need to be reset.

Right above the speed pilot valve coil in Fig. 6, you see the safety relay coil *SAR*. This coil is the "watch dog" for the speed regulating circuit. Suppose an open or a short develops in any part of this circuit. It would reduce or stop current flow to the speed pilot valve coil and the governor would try to speed the engine up. The safety relay is held closed by this same current. If the current goes too low, *SAR* will drop out and shut the engine down. *SAR* also gives protection against mechanical failure of the tach generator. If you find that *SAR* won't hold in when you start the engine, check the parts of this circuit.

In learning about the governor, we found that besides controlling speed, it also had the job of limiting engine fuel for each notch. We found that this was done by a fuel limit cam which was positioned by a fuel limit pilot valve and slave piston like the ones used for speed control.

In Fig. 7, you see the circuits used in positioning the fuel limit cam. Current flows from the battery source *71* down through the fuel limit pilot valve coil, the governor-operated *131* rheostat, the notching resistors and out to the *4* wire.

The fuel limit pilot valve, like the speed pilot valve, balances at 0.475 amps. If the throttle is advanced, a step on the notching resistor is cut out and the coil current increases. As a result the fuel limit slave piston moves to turn the *131* rheostat brush arm and cut in the same amount of resistance as was cut out on the notching resistor. If notching resistance is cut in, the *131* rheostat arm is turned to cut resistance out. This happens every time the throttle is moved. The fuel limit cam is driven from the same shaft as the *131* rheostat, so its position is determined by the position of the *131* rheostat brush arm. This is determined by the notching resistance which, in turn, is set by the throttle position.

If you run into trouble with the fuel limit circuit, it will probably be an "open" somewhere. This might be an open coil, an open rheostat or dirt under one of the rheostat brush arms. You will hear about it from the operating crew—as a sluggish locomotive, lack of power, or can't get up any speed.

On the road you can quickly spot this trouble. If the fuel limit rheostat brush arm *131* is in the third notch position when the throttle is in the eighth notch position, you can be fairly sure that there is an "open" somewhere in the circuit.

Here's an easy way to check the fuel limit circuit in the shop. Before you start, be sure that the fuel limit brush

arm is correctly positioned on the shaft. The instruction book tells you how to do this. Set the engine up for a dry run and engage the clutch arms. The way to do this is also described in the instruction book. Operate the fuel limit pilot valve with your finger. When you get the required rack reading for notch *3*, mark the position of the fuel limit brush arm. Do this for notch *5* and also for notch *7*.

Now start the engine. Run it for a few minutes to allow the battery to come up to normal voltage. Put the throttle in position *5* and adjust the *161* rheostat, Fig. 7, to move the brush arm to the position *5* mark that you made on the fuel limit rheostat. Put the throttle in position *3* and adjust the *124A* rheostat to move the brush arm to the position *3* mark. Then put the throttle in position *7* and adjust the *124* rheostat to move the brush arm to the position *7* mark. If much adjustment is required for any notch you should recheck the other settings.

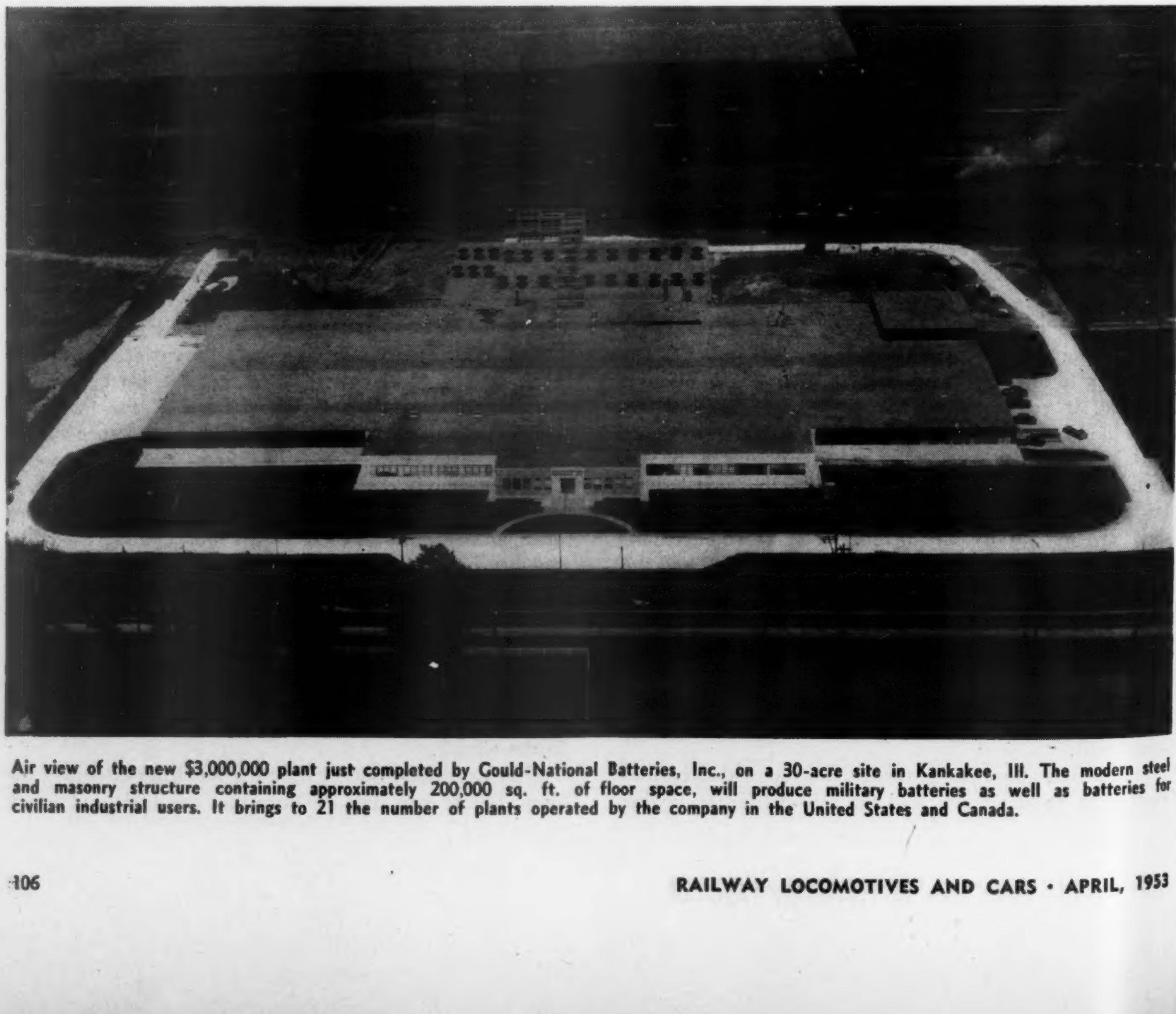
If the fuel limit brush arm doesn't move when the throttle is moved, look for an "open." If it won't settle down in some throttle notches, look for dirt spots on the fuel limit rheostat.

The Notching Relays

Figure 8 is a picture of the notching relays as you will find them on the locomotive. Figure 9 is a simplified sketch of the speed controlling and the fuel limit circuits of Figs. 6 and 7. It shows how the eight notches are set by means of the notching relays pictured in Fig. 8. Movement of the throttle operates the relays. You will note that there are two distinct current paths. By following the arrows, you can see where the current goes in each circuit. Note that as resistance is cut into the speed circuit, it is cut out of the fuel limit circuit. By combining the two circuits in this manner, only one notching resistor and one set of notching relays are needed. With this setup, we kill two birds with one stone. A further advantage is that the fuel limit setting and the speed setting are tied together. One cannot be changed without changing the other. If you have trouble with both the speed and the fuel limit on a locomotive, check this part of the circuit. A resistor may be open. The trouble may also be caused by a damaged or dirty relay contact, or by an open relay coil.

Don't Put It Off

You probably remember the story of the man and the leaky roof. When it wasn't raining he didn't need to fix the leaks. When it was raining he couldn't do it because it was too wet to work! That's about the way it goes with engine control. When the locomotive is in the shop, you don't need it. When the locomotive is dispatched, you don't have time. So take a tip from the leaky roof. Study the engine control system on your locomotives and find out how it works now. Then when the pinch comes you won't be caught.



Air view of the new $3,000,000 plant just completed by Gould-National Batteries, Inc., on a 30-acre site in Kankakee, Ill. The modern steel and masonry structure containing approximately 200,000 sq. ft. of floor space, will produce military batteries as well as batteries for civilian industrial users. It brings to 21 the number of plants operated by the company in the United States and Canada.

EDITORIALS

Is Step Size Boring Always the Best Practice?

There are good reasons for wheel shops to follow the step size practice in turning wheel seats on secondhand axles and boring wheels, and there are good reasons for miking each wheel seat individually and boring the wheel to fit. Advocates of the former practice seem to be in the majority today because the reasons favoring step size machining assume increased production.

Proponents of individually miking each wheel seat can, however muster at least one good reason for their belief. It increases potential axle life because only a minimum of metal need be removed from the wheel seat, increasing the chance of being able to fit the axle the next trip to the shop. More metal, of course, must be bored out of the wheel, but there is still a net gain in keeping the axle at a maximum size as far more secondhand axles can be reused than secondhand wheels.

With an existing layout, it should not be difficult to get a pretty clear and definite answer as to which practice is best. In a large wheel shop having a half dozen or so boring mills, it could get pretty complicated miking each wheel seat, marking the seat and the wheel bored to fit it, and then getting the right combination at the wheel press. Similarly, some or all of the boring mills in a large shop would likely be too far from the delivery line between the lathe and the wheel press for it to be feasible to have the boring-mill operators running back and forth from his machine to the axle in order to mike the wheel seats.

Conversely, however, in a moderate-size wheel shop—say, with a production around one or two thousand pairs of wheels per month—with only two or three boring mills located close to the axle line from the lathe to the wheel press, it would not be difficult for the machinist to mike each wheel seat. Where close enough, he can mike one wheel seat while another wheel is being bored, thus losing little or no time making the individual measurements. Therefore production should not be inferior to that attained by using step sizes, and the advantages from removing only a minimum of wheel seat metal would be in the form of a bonus. In fact, production might be greater if the limiting factor is axle lathe capacity rather than wheel boring capacity.

What then should be the layout of new wheel shops. Can the arrangement be made so that individual measurements can be made without sacrificing production? Will they increase the number of times an axle can be remounted Will the benefits justify any additional expense in making the layout, and will they be great enough to compensate for any disadvantages that may arise from revising the plans to permit individual measurements? If all these questions can be answered yes, it may be better to lay the new shop out for individual wheel seat measurements.

How Long Will a Diesel Last?

Ask any operator how long a diesel-electric locomotive will last and he will tell you it can be made to last indefinitely; that it can be maintained at 80 or 90 or 95 per cent of its original condition from now on. Originally, it was thought this could be done solely by replacing parts as they wore out or became defective. The hope was that such replacements could be made without taking the locomotive out of service. Now, it is becoming a generally accepted premise that diesel-electric locomotives must be given class repairs at specified intervals to bring all parts that require it up to first class condition.

Accepting this change in procedure, we can again ask how long will a diesel last? Switching locomotives which have been in service more than 25 years are still doing fine. There is also a rapidly increasing number of road locomotives which have been in service more than ten years. This means they have passed their eight-, or ten-, or twelve-year overhaul period. It is at this time that, among other things, they must be rewired, since nearly all were wired with varnished-cambric insulated wire and cable and ten years is about the limit of the life of this kind of insulation on a diesel road locomotive. Perhaps this offers one measure of life expectancy.

It is hoped that new wire and cable (usually rubber-insulated and neoprene-coated) with the necessary conduit or duct, will last longer than that installed when the locomotive was new,—perhaps 15 or 20 years. We wouldn't want all parts to last exactly the same length of time and then have the locomotive fall apart like the One-Hoss Shay, but we do wish to get our money's worth out of the parts we put in.

Suppose the wire and cable will last 20 years and in the process minimize trouble due to faulty insulation. We may have to charge the cost of the wire to trouble-free service, since it may not be desirable to continue the locomotive in service that long. The factors that will take a locomotive out of service are maintenance costs and obsolescence.

Taking maintenance cost first, it has risen on each locomotive from the day it was placed in service. Many operators say this cost is too high and it has been said that it will come down. The transition from steam to diesel came so fast that little was known about maintenance, or maintenance facilities required, and it was important to keep these expensive new gadgets in service, even though the cost of doing it was a bit high. It was thought that when maintenance was better organized, costs would come down. But they have not. They continue to rise, at a declining rate, to be sure, but they continue to rise. If any verification of this continuing rise is necessary, there are electric locomotives, 37 years old, the maintenance costs of which are still rising even when the difference in dollar value for the 37 years is taken into account.

To cause obsolescence, there are always such possibilities as improvement of the present gas-turbine locomotives and a diesel engine which can burn heavy fuel. Increasing liquid fuel prices could make electrification take over on some heavy traffic lines. But the most probable cause of obsolescence is better diesel locomotives; new designs that have more power, that can cover a wider gamut of performance requirements and that are simpler and less subject to failure.

The question then becomes, not how long will a diesel last, but how long can a diesel be kept in service profitably. There is no simple answer to such a question, but as designs are improved, it becomes increasingly important to study the advantages of improved types and the rising maintenance costs of older locomotives in service.

Human Relations and the Foreman

It is encouraging to note the emphasis now being placed on improved human or personnel relations between railway supervisors and men working for them, especially the realization that thoroughly able and experienced machinists or mechanics, for example, do not necessarily make good foremen. Something more is needed and one of the best means of providing it both for older foremen and younger men still on the way up is by means of well-planned supervisor training courses such as have been used with good results on numerous railroads.

In discussing this subject at a meeting of the Chicago Railroad Diesel Club last Fall, V. E. McCoy, chief purchasing officer of the Milwaukee Road, said it is surprising how often, in evaluating the work of individual foremen, questions are raised not about their technical knowledge and ability but about how they get along with people and what the men under their supervision think of them as individuals. Does this mean that education, apprenticeship, training and experience on the job are of no importance? Obviously not. It is simply that men are expected to have certain basic abilities, knowledge and ambitions or they would not be considered for advancement. The important thing which "makes" or "breaks" them as supervisors, however, is the "human factor".

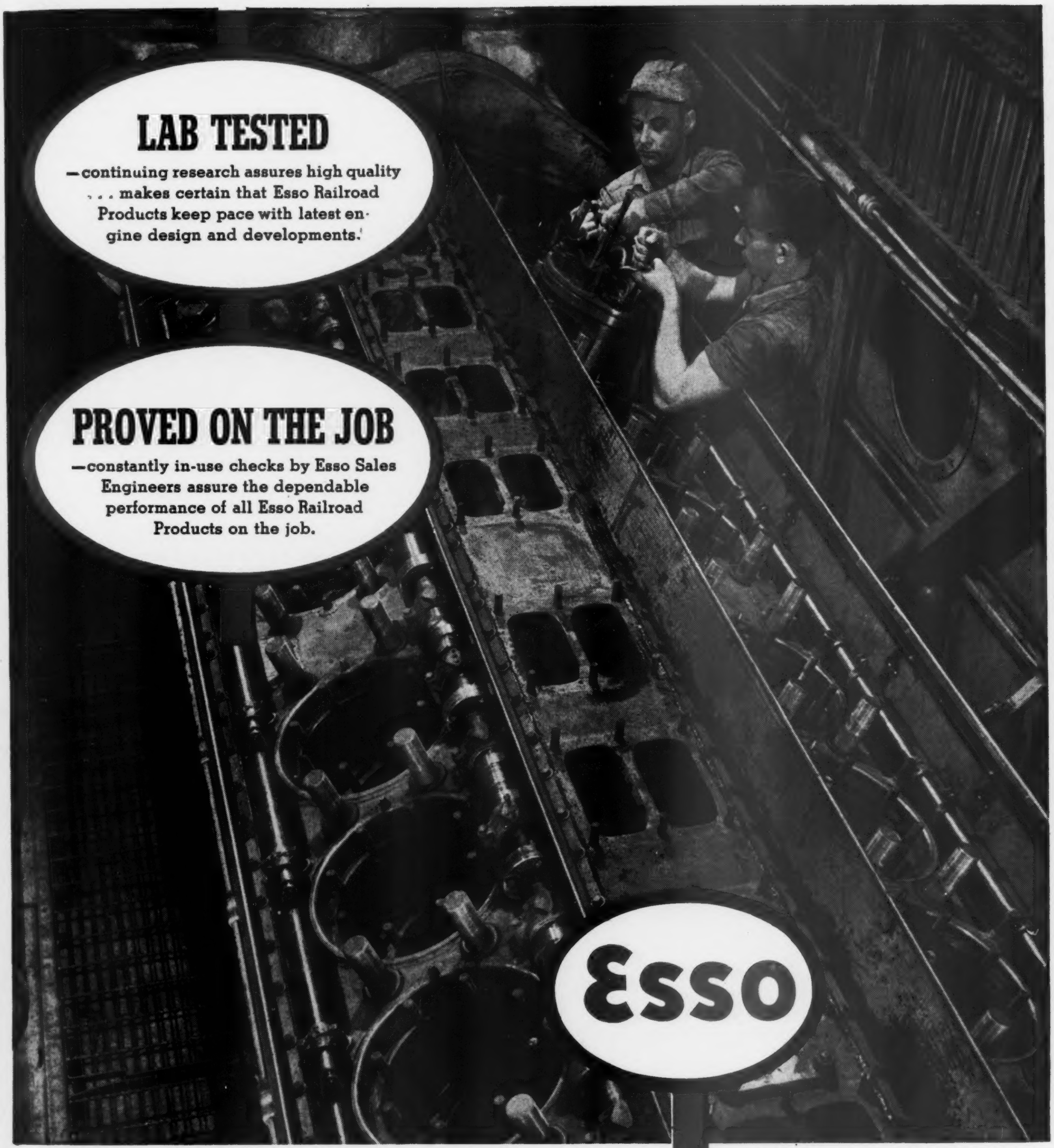
The following instance, cited by Mr. McCoy, will bear repeating because it aptly illustrates the point. A steel company in the Pittsburgh area was worried about production in its hot mill. The most optimistic estimate of what could be turned out was 7,800 tons a month, a production rate so low it created a "bottleneck" and held up the work in other departments. The assistant superintendent of the hot mill was a big man physically and believed that the authority of his position plus that of his fist was all that was required to get desired production, failing to realize that men can find many ways of slowing down on the job and causing trouble for supervisors they don't like.

To brief this particular case, the assistant superintendent proved to be quite an intelligent man. His management persuaded him, somewhat reluctantly at first, to study a program in human relations. He tried out some of the first principles taught, found them effective and ended up by insisting that every supervisor under him be permitted to take the same training course. It is reported that within a few weeks production climbed to 9,200 tons a month without adding a single machine or hiring one additional man. The bottleneck in the production line was completely eliminated and the men were happier. It is estimated that the company was saved an investment of $1½ million and reduced operating expenses by over $100,000 a year.

NEW BOOKS

Engineering Manufacturing Methods. *By Gilbert S. Schaller, professor of mechanical engineering, University of Washington. Published by the McGraw-Hill Book Company, 330 West 42nd street, New York 36. 613 pages, 6 in. by 9 in. Cloth bound. Price, $7.*

This book is intended to give the student an insight into engineering manufacturing methods and their potentialities. It integrates manufacturing methods into the engineering educational program through the use and correlation of engineering design, material, production standards, and codes in discussions. While there is little actually new in the text, light metals are given attention commensurate with their increasing importance in manufacturing, and foundry subjects are approached from the viewpoint of the production of economical quality castings. Plastics and copper-base alloys are also covered as well as new developments in plastic patterns. Emphasis in the treatment of machining is placed on fundamentals with special attention to those machine tools and methods that are of widest usage. The section on welding discusses the potentialities of each type of welding and includes references to welding codes and engineering standards.



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NEW DEVICES

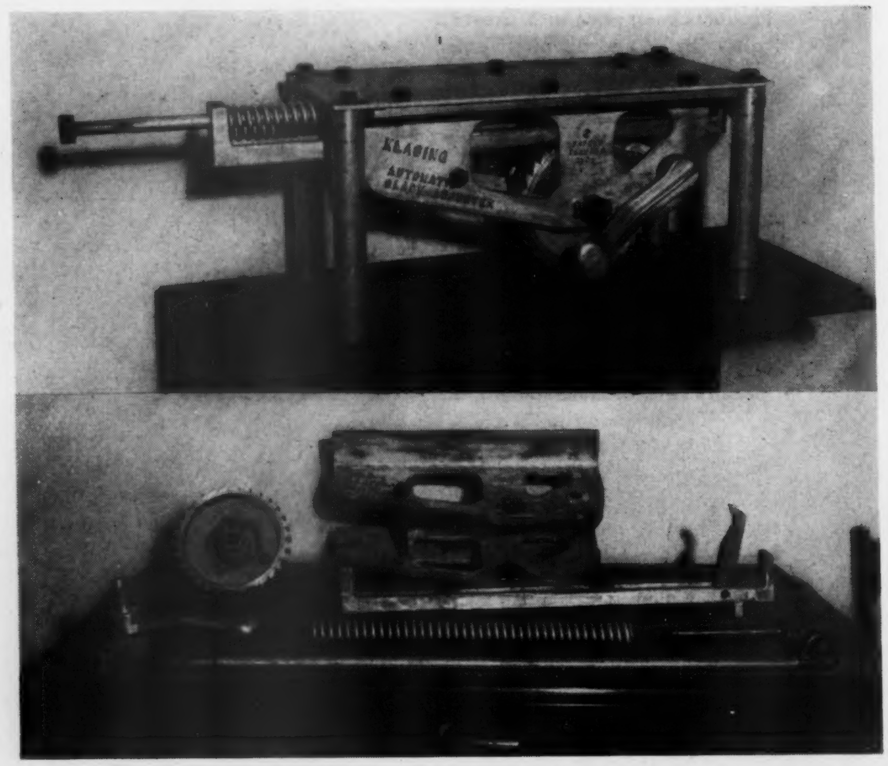
Klasing Slack Adjuster

After two years of exceptionally severe tests on a 70-ton gondola car in 24-hr. bar-steel-mill service, the mechanical automatic slack adjuster illustrated has been applied to freight cars on eight railroads. It is manufactured by the Klasing Hand Brake Company, Joliet, Ill., and sold through the P-W Specialties Corporation, 79 East Adams street, Chicago, and its representatives. A special feature of this slack adjuster is the use of only seven major parts which are easily assembled and held in place by a single cotter and a small nut.

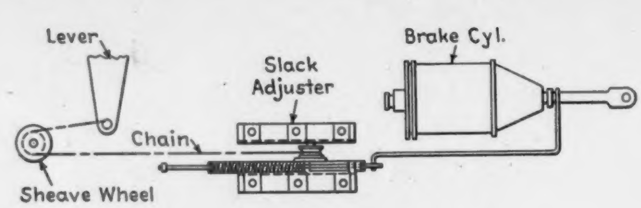
The Klasing slack adjuster is said to keep piston travel between any prescribed limits described within a range of less than one inch wear on brake shoes and foundation brake rods and levers. The device operates in harmony with the power brakes and independently of the hand brake with no connection to the brake cylinder or hollow piston. It is mechanically locked against shocks, preventing false take-up or let-out of piston travel, except by manually lifting the release lever.

This slack adjuster is designed to operate without lubrication. The spring is of chrome vanadium steel, cadmium plated. The gear shaft operating rod and hexagon nut are steel, all other parts being malleable iron. All parts of the slack adjuster, except the operating rod and lever, are held under a spring tension of 100 lb. in release position of the brakes, thus preventing vibration. When brakes are applied, the parts are held in position by the brake-cylinder pressure load, which avoids free slack in changing from release to load or the reverse.

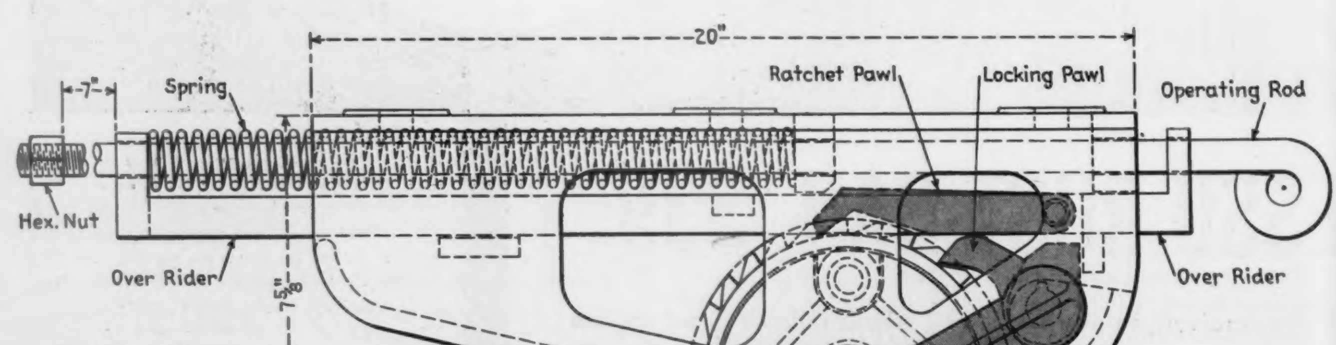
As installed on a car, a rod formed at one end so that it surrounds the cylinder



Klasing automatic slack adjuster (above) disassembled (below) to show the seven major parts.



One method of application.



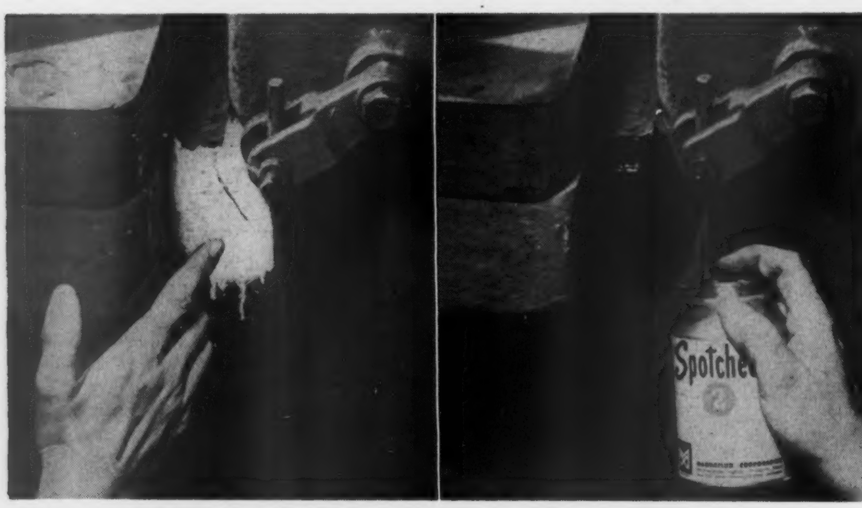
Construction of Klasing automatic slack adjuster which is ragged in design.

Photo courtesy
Denver & Rio Grande Western Railroad

push rod is connected to the eye of the slack-adjuster operating rod. Excessive piston travel causes the rod to move the over-rider and ratchet pawl against the compression of the sprng. When the brakes are released, the spring returns the over-rider and the ratchet pawl rotates the gear, taking up the slack through a chain connection to dead cylinder-lever fulcrum. The locking pawl prevents the unwinding of the chain at the next brake application.

With this slack adjuster, any adjustment of foundation brake rods and levers is said to be unnecessary, thus effecting an important saving in material and labor costs. Lifting the release lever releases all slack and, after repairs or brake shoe renewals, the piston travel take up automatically without further attenion by car men. When manual adjusment is desired, it is available by lifting the release lever and turning the ratchet gear by hand.

The Klasing mechanical automatic slack adjuster weighs about 90 lb., which reflects a sturdy design expected to withstand any condition of operation and give dependable service for the life of the car to which it is applied. The suspension brackets are practically duplicates of those used to support brake cylinders and, hence, car men require no new tools or special skill in applying the slack adjuster.



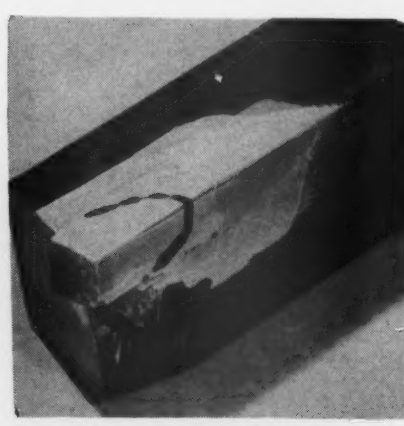
Spotcheck method of testing machine part — Initial application of penetrant (right); crack shows red through white developer (left).

New Spray-On Dye Penetrant

A new spray-on dye penetrant, called Spotcheck and used to locate cracks in any solid material, is announced by the Magnaflux Corporation, 5900 Northwest highway, Chicago 31. The penetrant is supplied in small pressure-loaded cans from which it can be released in a fine spray, as desired, by pressing a push button in the cover.

Each penetrant can is part of a packaged test kit contained in a strong carrying case which may be easily taken in one hand to any point where mechanical equipment, tools, welded joints, castings and forgings need to be checked either when new or in the course of general repairs. In the railway field, this test method will evidently be most widely used in discovering defects in locomotive and car parts, maintenance-of-way machinery, also shop and track tools. The actual tests for cracks are made quickly and no power or special lights are required.

The dye penetrant is sprayed on the surface which has been cleaned preparatory to testing. Application of the spray is easy and non-critical, like spreading insect spray from a pressure can. Then a solvent is sprayed on and quickly wiped off to remove penetrant on the surface. An even coat of white developer is brushed on, and the surface is ready for inspection in a few seconds, cracks showing up as bright red



Spotcheck red line indication which marks otherwise invisible crack in a carbide-tip cutting tool.

lines, and pores or leaks as bright red spots.

Spotcheck inspection is said to be best and cheapest when applied to local areas of large parts, or in remote locations where only a few parts are to be tested. It is especially adapted to use in tool rooms or tool cribs. The dye penetrant is nontoxic and an outgrowth of long Magneflux experience in non-destructive testing and developing fluorescent penetrants for volume inspection in all metal-working industries.

As the use of non-destructive testing increases, both industries and railroads will benefit greatly from reduced cost and waste of cracked parts. The new spotcheck dye penetrant inspection is expected to expand these benefits and promote safety as well as economy.

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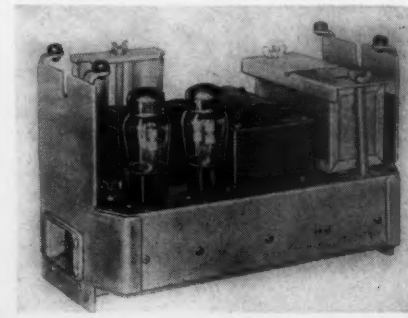

Caboose Power Supply

A 12-volt d.c. train power supply that eliminates the need for an a.c. converter and incorporates a plug-in vibrator cartridge capable of operating both transmitter and receiver has been developed by Federal Telephone and Raido Corporation, Clifton, N. J., associate of International and Telegraph Corporation. Designed specifically for use in caboose installations, the power supply unit (Type M322-1) has been engineered to meet the growing use of the 12-volt d.c. caboose electrical system by American railroads.

The power supply unit is featured by simplicity of design. The maker states that with a more reliable and conservatively-rated vibrator, long-life tubes and components, servicing requirements are reduced to a minimum.

The circuit employs a heavy-duty railroad-type plug-in vibrator with full-wave tube rectifiers, weighs 35 lb., and has a temperature range of —20 deg. F. +140 deg. F. Nominal input voltage is 12.6 volts d.c., while the output voltage is rated 110 m.a. at 300 volts d.c. for the receiver and 325 m.a. at 300 volts for the transmitter.

■

Silicone Insulating Varnish

Silicone varnish No. 997 is a new Class H dipping and impregnating varnish made by Dow Corning Corporation, Midland, Mich. The maker states that this varnish has over 100 times the dielectric life of typical Class B varnishes at 200 deg. C. and shows even less tendency to bubble on curing. Total processing times are therefore comparable to those required for Class B machines and only ¼ to 1/7 as long as those previously required for Class H equipment.

The manufacturer also states that the handling characteristics of the varnish may be more important than the increase in dielectric life, since it shows less tendency to bubble at 300 deg. F. than some of the better organic varnishes. Graduated curing temperatures are no longer necessary because Class H equipment impregnated with varnish 997 can be placed directly into an oven at 400 deg. F. without bubbling.

Even though somewhat higher baking

temperatures are still required, total processing times for equipment impregnated with Varnish 997 are now about the same as those used in the production of comparable Class B equipment.

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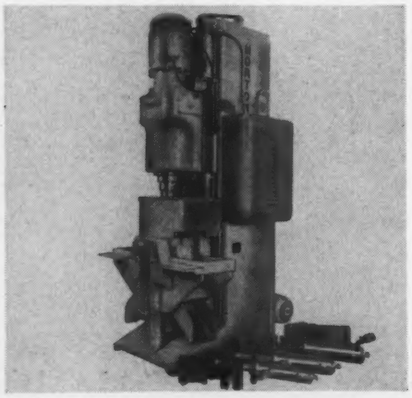


Morton Vertical Boring And Finishing Machine

The machine illustrated, is supplied by the Morton Manufacturing Company, Muskegon Heights, Mich., for performing both the rough boring operation before babbitting and the finish boring operation after babbitting of A.A.R. car journal brasses.

The saddle is fitted with suitable bearing plates and gibs to provide for accurate guiding on the hardened ways of the column. It is bored to receive a special heavy-duty boring spindle which operates in anti-friction bearings. A 15-hp vertical moto rdrives the spindle through the gear box. Sliding reduction gears permit adjusting spindle speeds for rough boring and finishing operations. Power for clamping and for feeding the cutters is from a self-contained hydraulic circuit, driven by a 5-hp. motor and control equipment.

The spindle is a steel forging accurately machined and ground and provided with anti-friction bearings mounted in the saddle to form a rigid support in the saddle for the extended boring bar. The spindle has a large flanged end with a pilot so that the various diameters of cutting heads may be quickly applied and secured to it.

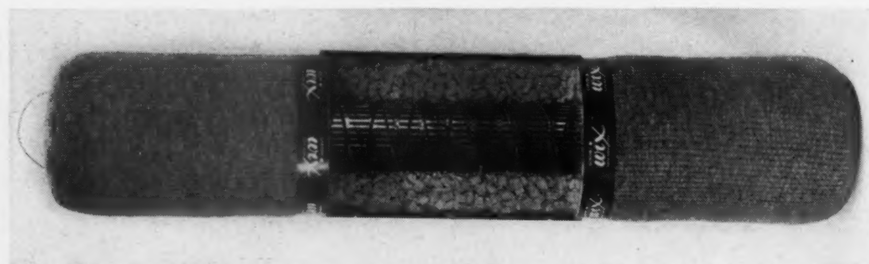
The bearing carrier members rotate from the horizontal loading position to the vertical boring position by means of an hydraulic cylinder. The clamping pressure is applied against the back of the brass to hold its milled toe surface against parallel spacers, interchangeable for various sizes of bearings. The same chuck plates or centering liners used for rough boring brasses are also used for alignment of brasses for finish boring after babbitt lining.

The cutter heads for rough boring are of special design with a special cutter head for each diameter of journal bearing. The upper portion of the cutter head is flanged so that it is quickly bolted to the flange of the spindle. The body of the cutter head is kept as large a diameter as the bearing size will permit. Two adjustable filleting and facing cutters are mounted in suitable openings of the flanged portion of the cutter head for filleting and facing the large fillet end. At the lower end of the extended body are four inserted adjustable carbide-tip cutters which are used for machining the main bore of the castings. These are adjusted so that two cutters are used for roughing and two cutters for sizing and refinishing. The radial movement of the filleting and facing cutter finishes the bearings to overall length.

One special cutter head and two chuck plates are required for rough boring each size of A.A.R. bearing. One special cutter head is used for finish boring each size. Carbide-tip cutting tools are used throughout the cutter heads.

This machine is semi-automatic in operation and has suitable control devices for the following cycle of operation: Two bearings are placed in the centering fixture with the machine in the loading position. The loading height is such that operator fatigue is negligible regardless of the weight of the bearing. Upon pressing the start button the hydraulic clamp cylinder moves tthe carrier arms to the vertical clamping position. At the completion of this cycle the cylinder retracts, the saddle raises to clear the large fillet facing cutter and the bearing carriers start to open simultaneously with return to stop position.

Semi-automatic operation of the machine assures efficiency and worth-while production results. In unloading, the bearings fall down a chute onto conveyors and move away from the machine.

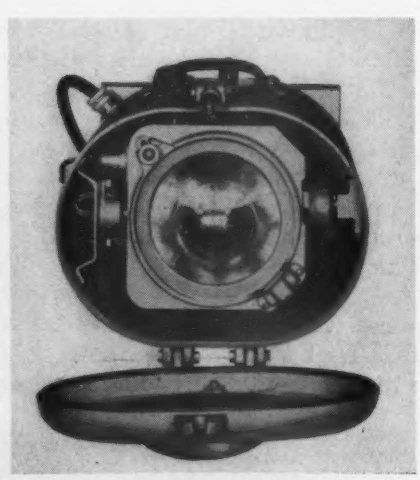


Felt Paper Filtrant

A felt paper oil cartridge, specifically designed for railroad service by the Wix Corporation, Gastonia, N. C., is n w available after extensive in-service testing.

This blended gray felt paper is made with a cotton stock content of not less than 75 percent. Paper is cut into squares of controlled size depending on application and hydraulically packed into cartridges.

During use, the flow rate at any given pressure is slightly higher than that of waste type cartridges. Active detergents in lubricating oils are not removed by passage through the unit. Flow can be predetermined by the size of the paper squares and density of pack.



Industrial Warning Signals

The Pyle-National Company, Chicago 51, has announced three models of its Gyralite moving-beam warning lights. The lights project a high intensity colored or clear beam which rotates with a wide, sweeping action.

The unit illustrated is a Type 1740 Gyralite with a single PAR-46 sealed beam lamp mounted in gyrating mechanism within a cast aluminum alloy housing. Type 17340 is equipped with two type PAR-46 sealed beam lamps, one mounted in gyrating mechanism, the other mounted in the body as a stationary clear light for use as a headlight or back-up light on moving equipment. Type 15100 has a stationary lamp and rotating reflector for low voltage duty.

These visual warning signals have advantages over horns, sirens and bells in areas where the noise level is already high or where confusion might result were another sound signal to be added. The manufacturer states that when a Gyralite beam is sighted, the eye follows it to its source, thus pinpointing the safety hazard.

Some of the applications for the Gyralite are on overhead cranes or other hazardous moving equipment such as scale cars, transfer cars and other vehicles where they warn workers on or near the craneways or roadways of approaching danger. Portable Gyralites may be aimed on the ground pointing upward at crane operators to warn construction or repair crews working on the craneway. They are also used at hazardous doorways, crosswalks, open pits and manholes and for call signals in large field operations when distance is beyond the range of conventional sound signals.

THE ENGINEER'S REPORT

DATA

PRODUCT Calol Filter Coat

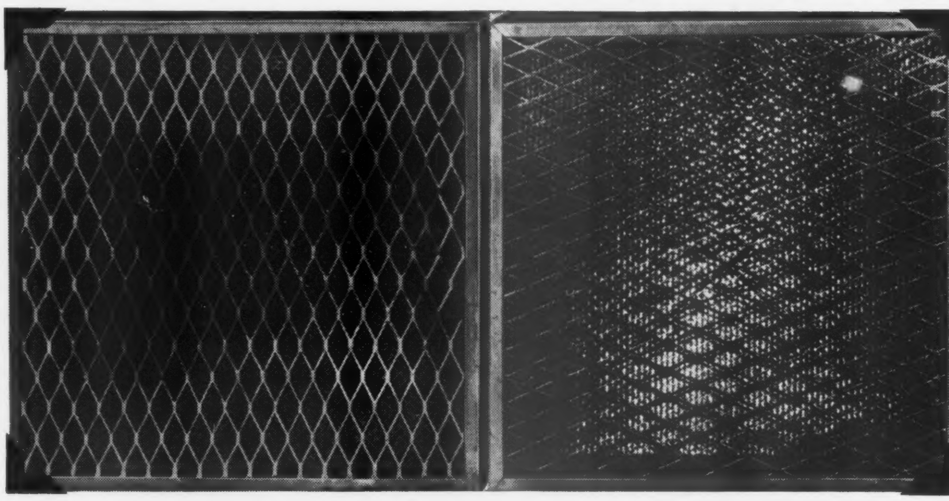
UNITS Air filters on diesel locomotive engines and car bodies

CONDITIONS Heavy dust due to rail-sanding on grades

LOCATION Roseville, Calif.-Sparks, Nev.

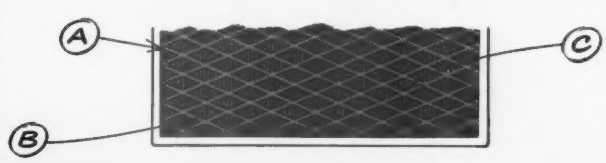
FIRM Southern Pacific Co.

New adhesive sets air filter efficiency standards!



CALOL FILTER COAT, a new type of adhesive tested on impingement-type air filters of 40 Southern Pacific diesel locomotives, allowed extension of normal filter servicing periods at least two times without appreciable loss of dust-catching efficiency. The car-body filter (immediate right) and engine air-intake filter, shown here, were photographed after 6400 miles of continuous use. Note that Calol Filter Coat is still evenly distributed, surfaces are still "wet" for maximum dust-catching efficiency and screens are still open enough to admit light through them. All Calol Filter Coat remained in place so that the use of drip pans was unnecessary.

How Calol Filter Coat Ups Efficiency of Impingement-type Air Filters



A. Will not drip off or flow from screens —full amount applied remains over the entire service period with sustained high-filtering efficiency at all ambient temperatures. Easily applied by conventional methods.

B. Has high wicking ability—quickly soaks through dirt particles in all air velocities and extreme dust concentrations.

C. No loss from contact with rain or snow, filters are easily cleaned with usual hot-water-detergent solutions.

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NEWS

All-Welding Exposition and Technical Meeting

A four-day, all-welding exposition sponsored by the American Welding Society will be held June 16-19 at the Shamrock Hotel, Houston, Tex., in conjunction with the Society's Spring Technical Meeting. This exposition will give an opportunity to the south and southwest to see demonstrations of the latest technical developments in the field of welding and its allied processes.

Most of the major companies of the welding industry will exhibit and demonstrate the welding equipment and processes. The exhibits will comprise welded fabrication, weldments, welding processing, gas cutting, grazing, finishing, tooling, gaging, testing, stress relieving, X-raying, servicing and handling.

A New Factor in Improving Journal-Box Performance

Two of the chief objectives of the Institute of Thread Machiners, Inc., whose members are manufacturers of journal-box packing, wiping waste, and filtering threads, have been the establishment of standards for the improvement of the industry's products and the cultivation of improved relations between the industry and its customers. Prior to the formation of the Institute, the industry's goodwill suffered due to the lack of any mechanism to establish proper customer relations or improve product standards.

Since its formation about three years ago the Institute has been responsible for raising the industry in the respect of the public and its customers and has been instrumental in the development of high industry standards as to its products and business conduct.

One of the first moves made by its members after the Institute was organized was the appointment of a special committee to cooperate with the Association of American Railroads on matters involving journal-box packing. This committee has met with various committees of the A.A.R. on several occasions to discuss the mutual problems of the railroads and the machined thread industry in an endeavor to find solutions to those problems and constantly to improve the quality and performance of journal-box packing. Progress is being made. Through such co-operative effort it hopes to contribute to the alleviation of the hot-box problem.

As the result of joint studies, some threads which would be extremely difficult to define minutely but which fall within the general category of threads which pass the specification have been voluntarily discarded as unsuitable. In this way voluntary standards for new journal-box packing were developed and endorsed by the Institute in co-operation with the A.A.R. Joint

(*Continued on p. 122*)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MARCH ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	*No. of Units*	*Horse-Power*	*Service*	*Builder*
Atchison, Topeka & Santa Fe	97	....	....	Various
Chesapeake & Ohio	45[1]	1,500	Road-switch	Electro-Motive
	4[1]	2,250	Passenger	Electro-Motive
	16[1]	1,000	Switch	Alco-G.E.
	2[1]	1,600	Road switch	Baldwin-Lima-Hamilton
Chicago & North Western	11	2,250	Passenger	Electro-Motive
	40	1,500	Road switch	Electro-Motive
	4	1,200	Switch	Electro-Motive
	12	600	Switch	Electro-Motive
	4	1,000	Road switch	Alco-G.E.
	17	1,600	Road switch	Alco-G.E.
	6	1,600	Road switch	Fairbanks, Morse
	3	1,200	Road switch	Fairbanks, Morse
	5	1,200	Switch	Baldwin-Lima-Hamilton
Chicago, St. Paul, Minneapolis & Omaha	1	1,000	Road switch	Alco-G.E.
	3	1,600	Road switch	Alco-G.E.
	5	1,600	Road switch	Fairbanks, Morse
Duluth, Missabe & Iron Range	15[2]	1,200	Switch	Electro-Motive
Georgia	2[3]	1,500	General purpose	Electro-Motive
Great Northern	16[4]	1,500	Freight	Electro-Motive
	3[4]	1,500	Road switch	Electro-Motive
	8[4]	1,500	Road switch. (with six motors)	Electro-Motive
	5[4]	1,500	Road switch	Alco-G.E.
	5[4]	1,200	Switch	Baldwin-Lima-Hamilton
Kansas, Oklahoma & Gulf	1	1,500	General purpose	Electro-Motive
Midland Valley	4[5]	1,500	General purpose	Electro-Motive
New York, Susquehanna & Western	2	1,000	Road switch	Alco-G.E.
Pennsylvania-Reading Seashore Lines	6[6]	1,600	Road switch	Baldwin-Lima-Hamilton
Spokane International	3	1,000	Road switch	Alco-G.E.
Western of Alabama	2[7]	1,500	General purpose	Electro-Motive

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Chicago & North Western	625[8]	Box	Pullman-Standard
	200[8]	70-ton gondola	Bethlehem Steel
	12[8]	Caboose	Internat'l Ry. Car & Equip.
Duluth, South Shore & Atlantic	100[9]	50-ton gondola	American Car & Fdry.
Gulf, Mobile & Ohio	400[10]	50-ton gondola	American Car & Fdry
Louisville & Nashville	1,000	Box	Pullman-Standard
	500	Gondola	Bethlehem Steel
	500	Box	Pressed Steel Car

PASSENGER-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Southern Pacific	15	Chair	Budd Co.
	10	Chair	Pullman-Standard
Union Pacific	5	Coaches	American Car & Fdry.
	5	Observation	American Car & Fdry.
	5	Dining	American Car & Fdry.
	30	Chair	American Car & Fdry
	25	Mail-baggage	American Car & Fdry

[1] Deliveries expected through June.

[2] Estimated cost, $1,600,000. Deliveries to be completed in April.

[3] Estimated cost, $324,496. Scheduled for April delivery.

[4] Deliveries made or being made through June. Authorization for the purchase of this equipment was reported in December.

[5] Delivered in February.

[6] Estimated cost, $1,032,900. For March and April delivery.

[7] Estimated cost, $324,496. Scheduled for April delivery.

[8] The box cars, to be built by the Pullman-Standard will have nailable steel flooring, special lading strap anchors in the walls and fibre glass insulation in the ends to protect grain and flour lading from weevils. The cabooses will be electrically lighted with power furnished by propane-burning generator units. Bay windows—rather than cupolas—have been specified. Delivery of the cabooses is scheduled to begin in August, of the box cars, in July, and of the gondolas in September.

[9] For delivery in September.

[10] To be provided with steel flooring and chilled tread wheels. Delivery expected to begin during the third quarter of this year.

[11] This is a restatement, totaling four less units, of an order previously placed last year by the UP for 74 passenger-train cars of various types. Delivery is scheduled for 1954. The coaches, observation cars, and diners will be astra-dome cars.

Central of Georgia.—This road plans to purchase 3,000 freight cars over a three-year period. The first 1,000 units will be 50-ton box cars with wide doors for transporting paper, clay and other products, loading machinery for which requires wide-door openings. Their cost is estimated at $6,000,000 and delivery is expected next fall. The remaining 2,000 cars will be bought in 1954 and 1955. The road also will buy this year an unspecified number of heavy-duty flat cars, costing about $25,000 each.

Pacific Fruit Express Company.—Authorization has been received from the joint owners of this company—the Union Pacific and the Southern Pacific—to acquire 200 new 50-ft. refrigerator cars. Of the total, 100 cars will be mechanically refrigerated for handling frozen foods at near-zero temperatures. Delivery is expected at the year's end.

Southern Pacific.—The SP has authorized purchase of 100 diesel locomotives comprising 150 units totaling 225,000 hp. The authorization includes 77 locomotives ranging from 800 to 6,000 hp. each for main- and branch-line freight service; 10 1,200-hp. switchers; and four 6,750-hp. passenger locomotives. When these units are delivered they will bring the SP's total postwar investment in diesel power to almost $200,000,000 in 1,257 diesel units.

Van Car Corporation.—Plans for the construction of 500 flat cars especially designed and equipped for accommodation of loaded highways semi-trailer have been announced by the Van-Car Corporation of Chicago—a wholly owned subsidiary of the Rail Trailer Company. The 72-ft. cars will be roller-bearing equipped, and will be able to handle two standard 32-ft. highway semi-trailers. Each car will be equipped with a newly-designed side-loading device. When completed, the new cars will be available for lease to railroads for their own use in moving loaded highway semi-trailers, the Rail Trailer Company announced

MORE "ROLL"

FOR THE RAILROADS!

Keep rolling stock on the move with faster overhaul and maintenance! That's the job being done today in modern shops with Whiting-engineered equipment . . . from drop tables to jacks! Take advantage of this same engineering and experience which has helped so many leading roads get greater availability and more operating revenue. Whether you are remodeling or planning a complete new shop, Whiting engineers will help you analyze your problems and recommend equipment that does more . . . *faster and at lower cost.* Write for full information today!

WHITING CORPORATION

15609 Lathrop Avenue, Harvey, Illinois

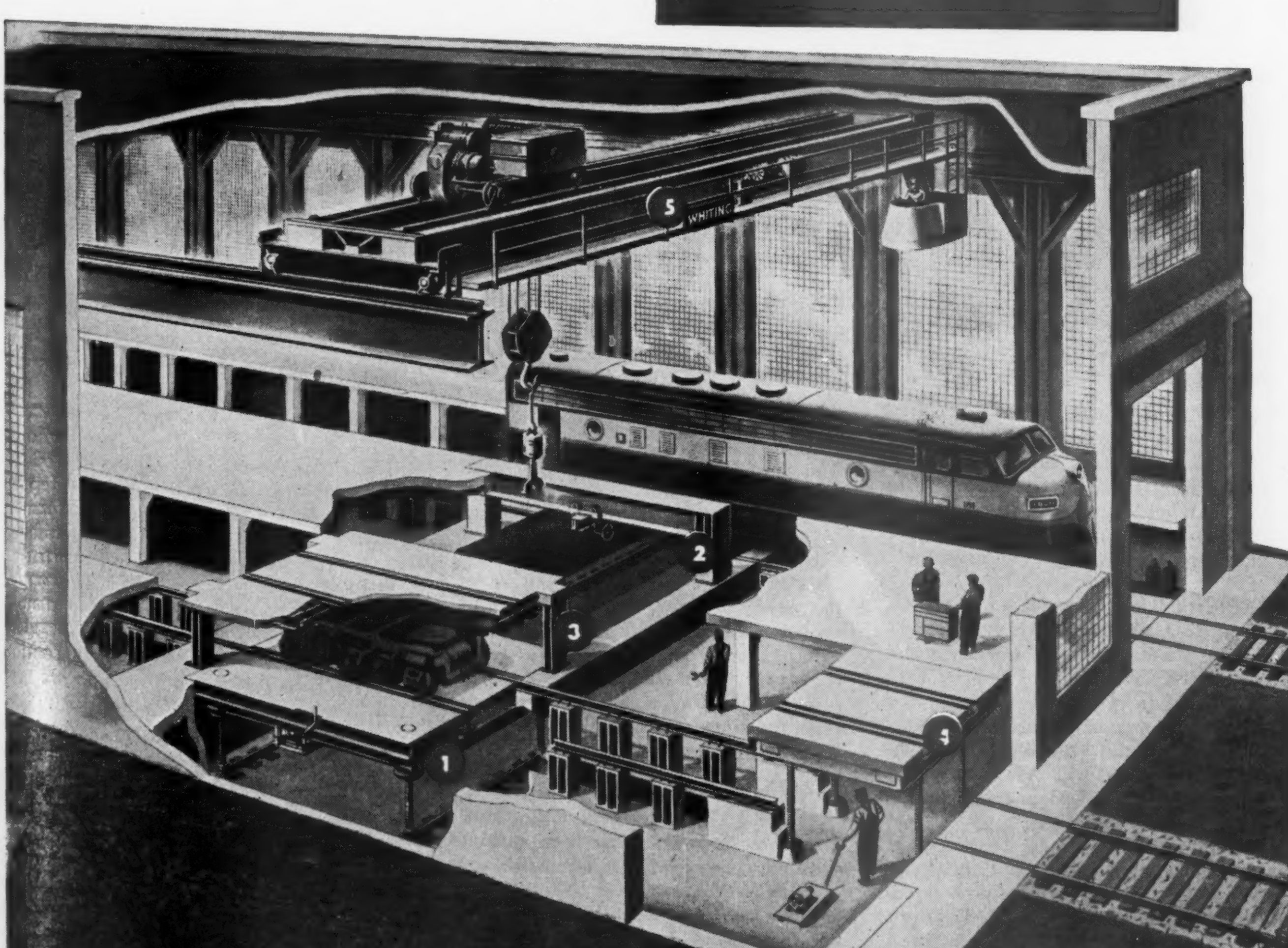
WHITING

RAILROAD EQUIPMENT

This "Service Station" Keeps Rolling Stock on the Move

1. Whiting Drop Table.
2. Whiting Locomotive Body Supports.
3. Whiting Release Track Cover—Automatically Operated Spacer Posts.
4. Whiting Triple-Duty Cross-Over Bridge.
5. Whiting Overhead Crane.

Also: Whiting Trambeam Overhead Handling Systems, Electric Chain Hoists and the Whiting Trackmobile.



Subcommittee on Journal Lubrication Research in order to furnish the railroads with the best new packing wholly within Specification E-M-905-50. Representative samples of both the threads to be used and the finished new packing were furnished to the A.A.R. as guides.

A recent development is the use by its members of Institute labels on all bales of new journal-box packing shipped to the railroads stating that the packing is manufactured in accordance with A.A.R. specifications.

The Institute is located at 141 East 44th street, New York 17.

SELECTIVE MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of November 1952	Month of November 1951	11 months ended with November 1952	11 months ended with November 1951
3	Road locomotive miles (000 (M-211):				
3–05	Total, steam	16,358	22,222	188,685	274,544
3–06	Total, Diesel-electric	29,147	24,804	301,388	248,998
3–07	Total, electric	747	793	8,317	8,935
3–04	Total, locomotive-miles	46,297	47,819	498,762	532,499
4	Car-miles (000,000) (M-211):				
4–03	Loaded, total	1,733	1,699	18,229	19,008
4–06	Empty, total	922	917	9,836	9,721
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6–01	Total in coal-burning steam locomotive trains	29,053	39,721	332,556	482,811
6–02	Total in oil-burning steam locomotive trains	8,521	10,546	92,730	130,939
6–03	Total in Diesel-electric locomotive trains	82,664	68,705	839,427	696,130
6–04	Total in electric locomotive trains	2,101	2,124	23,032	24,428
6–06	Total in all trains	122,483	121,106	1,289,063	1,334,446
10	Averages per train-mile (excluding light trains) (M-211)[1]				
10–01	Locomotive-miles (principal and helper)	1.04	1.04	1.03	1.04
10–02	Loaded freight car-miles	41.00	39.20	40.00	39.60
10–03	Empty freight car-miles	21.80	21.20	21.60	20.30
10–04	Total freight car-miles (excluding caboose)	62.80	60.40	61.60	59,90
10–05	Gross ton-miles (excluding locomotive and tender)	2,898	2,795	2,830	2,781
10–06	Net ton-miles	1,348	1,310	1,304	1,305
12	Net ton-miles per loaded car-mile (M-211)	32.90	33.40	32.60	32.90
13	Car-mile ratios (M-211):				
13–03	Per cent loaded of total freight car-miles	65.30	64.90	65.00	66.20
14	Averages per train hour (M-211):				
14–01	Train miles	17.80	17.10	17.60	16.90
14–02	Gross ton-miles (excluding locomotive and tender)	51,057	47,173	49,132	46,483
14	Car-miles per freight car day (M-240):				
14–01	Serviceable	47.40	46.40	45.10	46.20
14–02	All	45.20	44.30	42.90	44.10
15	Average net ton-miles per freight car-day (M-240)	969	962	907	961
17	Per cent of home cars of total freight cars on the line (M-240)	40.80	38.10	43.20	37.20

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

Item No.		Month of November 1952	Month of November 1951	11 months ended with November 1952	11 months ended with November 1951
3	Road motive-power miles (000).				
3–05	Steam	5,287	8,434	73,338	109,447
3–06	Diesel-electric	18,915	16,965	205,094	180,111
3–07	Electric	1,530	1,589	17,718	17,766
3–04	Total	25,732	26,988	296,156	307,325
4	Passenger-train car-miles (000):				
4–08	Total in all locomotive-propelled trains	258,447	265,404	2,963,209	2,997,852
4–09	Total in coal-burning steam locomotive trains	28,799	45,624	380,635	575,003
4–10	Total in oil-burning steam locomotive trains	19,482	28,489	273,180	355,661
4–11	Total in Diesel-electric locomotive trains	192,884	173,783	2,112,627	1,876,271
12	Total car-miles per train-miles	9.75	9.66	9.77	9.59

YARD SERVICE (DATA FROM I.C.C. M-215)

Item No.		Month of November 1952	Month of November 1951	11 months ended with November 1952	11 months ended with November 1951
1	Freight yard switching locomotive-hours (000)[1]				
1–01	Steam, coal-burning	738	1,064	8,794	13,152
1–02	Steam, oil-burning	154	224	1,820	2,604
1–03	Diesel-electric[1]	3,352	3,084	34,876	32,553
1–06	Total	4,265	4,396	......	......
2	Passenger yard switching hours (000):				
2–01	Steam, coal-burning	23	37	298	496
2–02	Steam-oil-burning	8	13	115	143
2–03	Diesel-electric[1]	253	245	2,808	2,665
2–06	Total	316	329	3,585	3,672
3	Hours per yard locomotive-day:				
3–01	Steam	7.30	7.70	7.00	7.80
3–02	Diesel-electric	16.60	17.20	16.20	17.20
3–05	Serviceable	14.80	14.60	14.40	14.40
3–06	All locomotives (serviceable, unserviceable and stored)	13.10	12.70	12.50	12.40
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.70	1.79	1.74	1.77
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.76	0.77	0.75	0.76

[1]Excludes B and training A units.

SUPPLY TRADE NOTES

FAIRBANKS, MORSE & CANADIAN LOCOMOTIVE COMPANY.—*William B. Morse*, formerly assistant to the manager of the Detroit sales and service branch, has been appointed manager, succeeding *E. J. Hay*, deceased. *J. F. Weiffenbach*, formerly vice-president in charge of manufacturing of the Canadian Locomotive Company, has been appointed chief product engineer, Manufacturing Division, Fairbanks, Morse & Co., with headquarters in Chicago. *W. E. Watson* has been named works manager of the Canadian company.

W. B. Morse

■

FRANKLIN RAILWAY SUPPLY COMPANY—BOWER ROLLER BEARING COMPANY.—The Franklin Railway Supply Company and the Bower Roller Bearing Company have joined forces to produce freight-car roller bearings. Under a new agreement, Franklin's subsidiary, the Franklin Balmar Corporation, Baltimore, will manufacture and sell freight-car journal boxes incorporating Bower roller bearings.

The Bower-Franklin roller bearing journal box assembly it is said, will utilize any inner race which may eventually be standardized by the Association of American Railroads, and that standardized interchangeable inner races will permit stocking of axles with the inner races pressed on, and their use with any roller bearing journal box conforming to the standards. The Bower-Franklin bearing assembly will utilize straight roller-type bearings.

■

UNITED STATES STEEL CORPORATION.—*Norman C. Halleck* has been appointed to the newly created post of transportation manager, Chicago district, United States Steel Corporation, with headquarters at Kirk yard, Gary, Ind. *Charles Iams, Jr.*, succeeds Mr. Halleck as assistant to general superintendent of the Gary Steel Works, in charge of cost control.

■

AMERICAN WHEELABRATOR & EQUIPMENT CORP.—*K. E. Blessing* has been appointed district manager of the company's sales office at 53 Newark Street building, Hoboken, N. J., and *F. John Pichard* has been appointed sales engineer. *David Logan*, sales engineer, and *A. J. Smith*, service engineer, continue in their posts.

WESTINGHOUSE ELECTRIC MANUFACTURING CORPORATION.—The Westinghouse Electric Corporation has consolidated its marine, transportation and aviation department in New York. *James C. Frink*, formerly eastern district marine manager, has been appointed district marine, transportation and aviation manager, and *Alexander Shirreffs*, formerly of the sales department at New York, has been appointed supervisor of the transportation and aviation section for the New York office.

■

T-Z RAILWAY EQUIPMENT COMPANY.—*Thomas J. Maines* has been appointed sales representative for the Pittsburgh area.

■

NATHAN MANUFACTURING CORPORATION.—The Nathan Manufacturing Company has reorganized as the Nathan Manufacturing Corporation. *W. G. Weygand* has been appointed general manager; *O. Wennberg*, vice-president, engineering; *M. W. McMahon*, general sales manager; and *R. H.*

Jenkins, special representative. There have been no other changes in the sales and service organization.

■

Bogue Electric Manufacturing Company, Belco Industrial Equipment Division.—*Edward H. Aldworth* has been elected vice-president of the Belco division. Mr. Aldworth will direct sales of Belco industrial water-treating equipment in the middlewest. Sales to railroads will be made through the Bogue Railway Equipment Division.

■

General Motors Corporation, Electro-Motive Division.— *C. T. Donovan* has been appointed sales manager of the La Grange factory branch of Electro Motive, and *A. W. Cryer* has been named branch representative. *A. E. Gasparini* and *R. G. Pommier* have been appointed district sales managers, and *J. A. Pylat* and *J. F. Greenip*, sales representatives, all at St. Louis.

■

Pyle-National Company. — Pyle-National has purchased the Oil Reservoirs division of the General Electric Company. All machinery and equipment necessary to produce the reservoirs is being transferred from G.E.'s Schenectady, N.Y., plant to Pyle-National's No. 2 plant at Chicago.

Technical Products Service & Sales Co., Louisville, has been appointed sales representative in that area for the Multi-Vent (low-velocity air panels) division of Pyle-National. Technical Products will serve the northern half of Kentucky and a portion of southern Indiana.

■

American Brake Shoe Company.—American Brake Shoe is expanding its facilities for the manufacture of powder metallurgy products. Production facilities are in the Hillburn, N. Y., plant, operated as a unit of the American Brakeblok division.

National Bearings Division.—*Sam R. Watkins*, assistant vice-president of the Brake Shoe and Castings Division, has been named vice-president of the National Bearings Division, with headquarters in St. Louis.

■

Wheel Truing Brake Shoe Company.—*John Graves*, formerly superintendent of diesel maintenance of the Ann Arbor, has been added to the staff of service engineers.

■

Farr Company.—The Farr Company, Los Angeles, has expanded territory served by its New Jersey representative, *A-C Products Company*, Paterson, to include the metropolitan New York area. Offices are being opened in New York by the representative to facilitate operation in the enlarged territory.

■

Turchan Follower Machine Company.—*Gale S. Humes* has been appointed general manager; *Otto C. Turchan*, sales manager, and *Demeter Kiurski*, chief engineer.

■

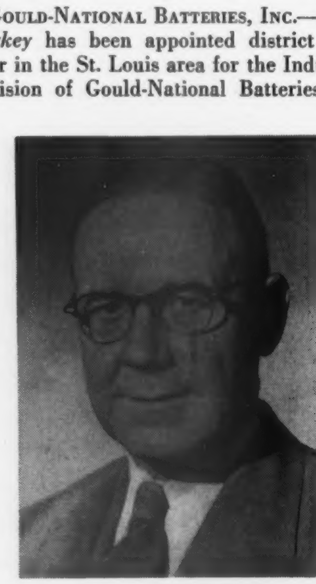
Pittsburgh Screw & Bolt Corp.—*Robert McNeal Smith* has been appointed assistant vice-president—sales, Eastern area, with headquarters in New York. *Samuel M. Sipe*, formerly sales representative in the western New York and Pittsburgh areas, has been appointed manager of sales of the New York district, to succeed Mr. Smith.

SUMMARY OF MONTHLY HOT BOX REPORTS

Month	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes: System	Foreign	Total	Miles per hot box car set off between division terminals
July, 1950	2,745,932,894	....	....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534.040

■

Gould-National Batteries, Inc.—*W. H. Burkey* has been appointed district manager in the St. Louis area for the Industrial Division of Gould-National Batteries, Inc.



W. H. Burkey

Mr. Burkey has been with Gould-National and its predecessors since 1930. Since 1941 he has handled accounts of railroads and other industrial users of batteries in the St. Louis area.

■

Lewis Bolt & Nut Co. — *Anthony C. Fecht* has been appointed general sales and advertising manager for the Lewis Bolt & Nut Co. Mr. Fecht entered sales for the company in 1944, managing the West Coast office in San Francisco. He was appointed manager of railway sales in 1945.

■

Texas Company.—*J. B. Flynn*, formerly assistant manager of the railway sales department, has been appointed manager of the department, with headquarters in New York.

Mr. Flynn joined the company in 1918 as representative of the railway sales department in San Francisco. He was transferred to New York in 1933 as a district manager, and in 1935 was appointed assistant manager of the department.

■

Philip Carey Manufacturing Company.—*Dan Call* has been appointed southeastern railroad representative for the Philip Carey Manufacturing Company. Mr. Call's title was incorrectly reported as railway sales manager in the February issue, page 92.

■

Pennsylvania Salt Manufacturing Company.—*Blake C. Howard, Jr.*, has joined the maintenance chemicals department of Pennsylvania Salt, to handle sales in the St. Louis territory. Mr. Howard formerly was with the Equipment Sales Corporation.

■

New York Air Brake.—*William R. Lockridge* has been appointed director of market development of the New York Air Brake Company. He will coordinate and direct overall sales and marketing policy and assist in appraisal of new company and new product acquisitions. Mr. Lockridge formerly was assistant secretary of the Bendix Aviation Corporation.

■

Union Asbestos & Rubber Co.—*William G. Gray*, manager of railroad sales for the Pittsburgh Steel Company, Chicago, has joined the Union Asbestos & Rubber Co., which he will represent on special assignments under the direction of *John F. Corcoran*.

■

Griffin Wheel Company.—*Edmund Q. Sylvester*, vice-president and director of the Griffin Wheel Company since 1946, has been elected executive vice-president.

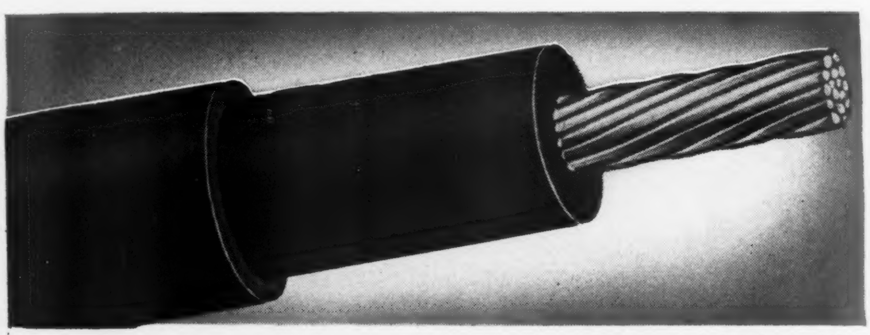
■

Simplex Wire & Cable Co.—The following changes have been made in the Simplex sales organization: *C. H. Sass, Jr.*, trans-

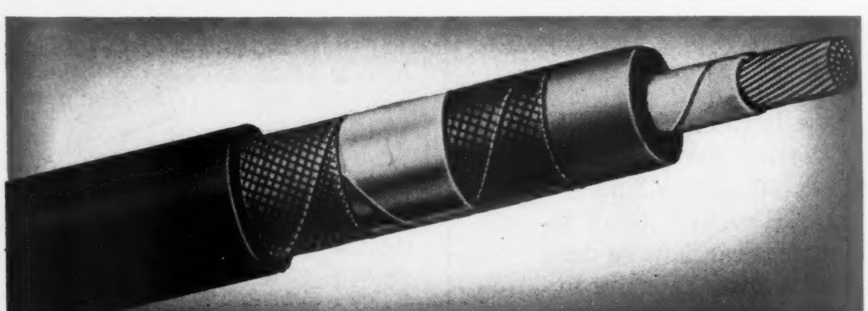
(*Continued on p. 126*)

For steady power distribution and general-purpose wiring railroads depend on

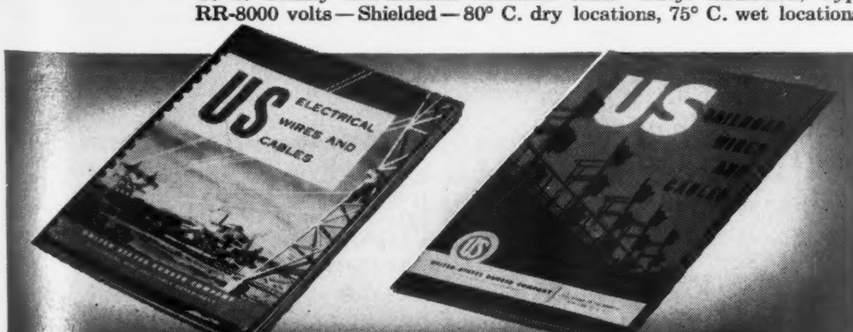
U. S. Grizzly®
Butyl Insulated Cable



U. S. Grizzly non-metallic sheathed cable—Butyl insulation, Type RR-600 volts—80° C. dry locations, 75° C. wet locations.



U. S. Grizzly non-metallic sheathed cable—Butyl insulation, Type RR-8000 volts—Shielded—80° C. dry locations, 75° C. wet locations.



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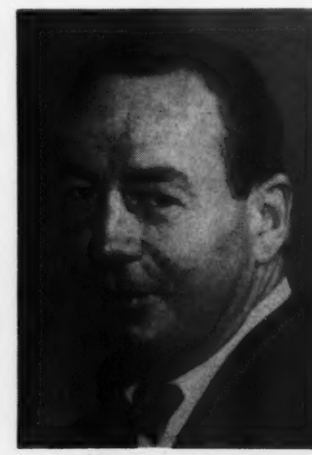
ferred to the Chicago office as railroad salesman, to deal with railroads having headquarters in the midwest; *E. A. Carlson*, of the inside railroad sales staff, to succeed Mr. Sass as New England representative for the railroad department; and *P. J. McHale* to head the inside railroad sales staff.

■

Dearborn Chemical Company.—*Robert F. Carr, Jr.*, who was recently elected vice-president of the Dearborn Chemical Company, has joined the sales organization at Chicago, to work with heads of the company's industrial and railroad departments to promote general sales of Dearborn products.



Robert F. Carr, Jr.

Mr. Carr joined Dearborn in 1934 after having attended the University of Illinois. After service with U. S. Coast Guard during World War II, he rejoined the company and was assigned to managerial duties in the Honolulu office in 1946. He has returned from Honolulu to accept his present appointment.

■

Chicago Freight Car & Parts Co.—*Edward J. England*, formerly general manager of the Chicago Freight Car & Parts Co., has been named to vice-president in charge of operations.

■

Romulus Tool & Engineering.—*Joseph Player* and *Edward Halik*, former employees of the Turchan Follower Machine Company, have formed Romulus Tool & Engineering to build jigs, fixtures, controls and special machinery. Mr. Player is president.

■

Gustin-Bacon Manufacturing Company.—*Barth Gilcrist* has been appointed division manager at Philadelphia for Gustin-Bacon, and *Leonard E. Feitt*, who was formerly resident salesman in Pittsburgh, has been appointed assistant to division manager.

■

Chicago Railway Equipment Company.—*D. E. Barton*, mechanical engineer—products, has been appointed plant manager in charge of manufacturing at Chicago and Franklin, Pa., plants. *John Holden*, former mechanical engineer of the Missouri-Kansas-Texas, has been appointed assistant chief mechanical engineer.

■

Whiting Corporation. — The Whiting Corporation has moved its St. Louis dis-

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trict sales office from 3238 Olive street, St. Louis, to 567 North and South road, University City 5, Mo.

■

PITTSBURGH PLATE GLASS COMPANY.—The *Union Asbestos & Rubber Co.*, Chicago, has been appointed distributor of Pittsburgh Plate Glass fiber-glass products to serve railroads, private car lines, and the railroad equipment industry.

■

PRESSED STEEL CAR COMPANY.—*John D. Small* has been elected vice-president of the Pressed Steel Car Company, with headquarters in New York.

■

SHERWIN-WILLIAMS COMPANY.—*H. E. Spitzer* has been appointed director of development for the Sherwin-Williams Company, with headquarters at Chicago, to supervise all the company's development laboratories, except the trade sales development section.

■

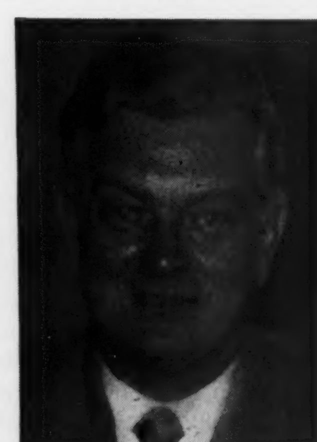
BENDIX AVIATION CORPORATION—SCINTILLA MAGNETO DIVISION.—*Thomas Z. Faagn*, has been appointed director of sales and service and *William A. Uline* general sales manager of the Scintilla division. Mr. Fagan, who joined the Scintilla sales organization in 1922, will continue also in his former position as director of advertising and public relations. Mr. Uline formerly was industrial sales manager.

■

IRVINGTON VARNISH & INSULATOR CO.—FIBRON DIVISION.—*Gordon C. Brown*, formerly sales manager of the Fibron (Plastics) Division at Irvington, N. J., has been named vice-president of the company and general manager of the Fibron Division. *Bernard M. Hoey* has been appointed sales manager of the division.

Obituaries

FRED HENRY SPENNER, vice-president in charge of mechanical engineering and executive assistant to president of the Scullin Steel Company, died on February 10 while on a business trip at Flint, Mich. Mr. Spenner was first employed by Scullin Steel



Fred Henry Spenner

in 1929, when he went to work as a blueprint boy in the engineering department. He received a certificate in mechanical engineering from Washington University, St. Louis, in 1936, and became assistant chief mechanical engineer of his company in

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1940. His promotion to chief mechanical engineer followed in June 1941, and he was elected vice-president in charge of mechanical engineering in April 1950. Additional duties as executive assistant to president were assigned to him in April 1951.

PERSONAL MENTION

Canadian National

W. H. Boulay, locomotive fuel supervisor, Atlantic Region, appointed superintendent motive power, Atlantic Region, with headquarters at Moncton, N. B.

Central Vermont

G. E. Spooner appointed chief diesel inspector, with system jurisdiction. Mr. Spooner will also be in charge of all diesel instruction activities.

Chesapeake & Ohio

James K. Hatchett, assistant to the shop superintendent at Huntington, W. Va., appointed to newly created position of assistant to superintendent of motive power, with headquarters at Richmond, Va.

Chicago, Burlington & Quincy

H. A. Rollwagon, assistant division master mechanic at Chicago, appointed master mechanic in charge of passenger service between Chicago and Aurora, Ill.

J. R. Van Nortwick, terminal master mechanic at Chicago, appointed master mechanic at Galesburg, Ill.

Denver & Rio Grande Western

Paul D. Starr, master mechanic at Grand Junction, Colo., appointed superintendent of diesel equipment.

J. K. Peters, mechanical engineer at Denver, appointed assistant to chief mechanical officer.

Robert L. Jacobsen, special apprentice at Burnham (Denver), appointed mechanical engineer at Denver.

Erie

E. H. Wright appointed assistant master mechanic, Michigan Central district, with headquarters at Jackson, Mich.

Richard H. Mitchell, road foreman of engines, Kent division, appointed road foreman of engines, New York division, with headquarters in Jersey City.

Lester E. Isham, road foreman of engines, New York division, appointed road foreman of engines, Buffalo and Rochester divisions, with headquarters in Buffalo.

Robert A. Bork, road foreman of engines, Buffalo and Rochester divisions, has retired.

Frank A. Robinson appointed assistant electrical engineer.

New York Central

PAUL W. KIEFER, chief engineer of equipment, Has retired after 48 years of service.

Born: Delaware, Ohio, February 13, 1888.

Education: Night school, Cleveland Y.M.C.A; Central Institute, Cleveland (1909-11); night studies in New York of locomotive and car design and operation (1916-25).

Career: Became a clerk in the Collinwood shops of the Lake Shore & Michigan Southern, (now the NYC) in 1904. Completed four-year machinist apprenticeship at Collinwood, at same time serving as assistant instructor in apprentice school. Subsequently became locomotive machinist and mechanical inspector; locomotive construction inspector and foreman construction inspector on new and converted steam locomotives for NYC at Baldwin Locomotive Works and Brooks Works of American Locomotive Company. In 1916 appointed locomotive designer and leading draftsman, office of mechanical engineer, NYC, at New York; in 1919, placed in charge of dynamometer car, locomotive capacity and train resistance tests; in 1920, appointed chief draftsman, locomotive department, office mechanical engineers; in 1921, assistant engineer and assistant engineer rolling stock; in 1924, engineer motive power; in 1925, engineer rolling stock; in 1926, chief engineer motive power and rolling stock, system; on January 1, 1949, chief engineer, equipment, system. Holds State Professional Engineers license and A.S.M.E. Medal (1947) for work in rail transportation.

P. W. Kiefer

Clubs and associations: Member New York Railroad Club; Newcomen Society; Franklin Institute; Fellow, A.S.M.E. Member also Mechanical Division, A.A.R., of which he was chairman of the Car Construction from 1930 to 1941. During this time he took a leading part in development of the steel-sheathed wood-lined box car for generally unrestricted service and in comparative extensometer and deflectometer tests of this car and earlier standard cars of the then American Railway Association. Author also of a number of papers presented before A.S.M.E.

W. S. H. HAMILTON, engineer, electrical equipment, has also assumed the duties of engineer, locomotive equipment as announced in the March issue.

W. S. H. Hamilton

Born: New Haven, Conn., December 31, 1890.

Education: Sheffield Scientific School of Yale University (Ph.B. 1910).

Career: Began in 1911 in the testing department of the General Electric Company, subsequently serving as designing engineer.

field engineer, commercial engineer, and electrification specialist. Appointed assistant electrical engineer of the NYC in 1931, equipment electrical engineer in 1934 and engineer, electrical equipment, of the system in 1949.

Norfolk & Western

C. E. Pond appointed superintendent motive power at Roanoke, Va., as announced in the March issue.

Education: Virginia Polytechnic Institute, June, 1923.

Career: Upon graduating from V. P. I. became a special apprentice in the Roanoke shops of the N&W. Two months later transferred to Portsmouth, Ohio, as a shop inspector. Returned to Roanoke as assistant engineer of tests in August, 1925. Appointed assistant foreman, frog shop, in February, 1928; assistant foreman of smith shop in January, 1937, and foreman of smith shop five months later. Became general foreman of foundry in September, 1938; assistant master mechanic of the Radford and Shenandoah divisions in June, 1939; assistant to the superintendent motive power in December, 1939, and assistant superintendent motive power—car in October, 1952.

C. E. Pond

C. S. Patton, Jr., appointed assistant superintendent motive power-car, as announced in the March issue.

C. S. Patton, Jr.

Education: Graduate of University of Georgia.

Career: Became a special apprentice in Roanoke shops of N&W in January, 1937. Promoted to helper car inspector in March, 1940, and gang leader five months later. Appointed gang foreman at Lamberts Point, Norfolk, Va., in 1941; car foreman in 1942; foreman of Roanoke passenger-car shop in March, 1944, and general foreman of car department in October, 1944. Served successively as general foreman at Lamberts Point, Williamson, W. Va., and Roanoke until October, 1952, when he was appointed assistant to the superintendent motive power.

G. W. Meredith, assistant master mechanic, Pocahontas division, appointed master mechanic of the division.

Seaboard Air Line

H. E. Aenchbacher, master mechanic at Savannah, appointed assistant shop superintendent at Jacksonville.

R. L. Lynn, assistant shop superintendent, locomotive department, at Jacksonville, appointed master mechanic, Alabama division, with headquarters at Americus, Ga.

R. L. Harper, master mechanic, Alabama division, appointed master mechanic, Carolina division, with headquarters at Savannah.

L. B. Alexander, shop superintendent, locomotive department, at Jacksonville, now shop superintendent, with jurisdiction over all mechanical department operations at Jacksonville shops. Position of shop superintendent, car department, at Jacksonville, abolished.

PERSONAL MENTION—*Obituary*

William Arthur Newman, chief of motive power and rolling stock of the Canadian Pacific at Montreal, Que., died on March 6.

Born: Hamilton, Ont., June 29, 1889.

Education: Queens University, Kingston, Ont. (B.S. in mechanical engineering, upon graduation; D.Sc. in 1952).

Career: Became special machinist apprentice at Angus shops in Montreal in 1911. Transferred to Smiths Falls, Ont., in 1912, six months later returning to Montreal as a draftsman. Appointed superintendent of betterments at Montreal in 1916, and chief mechanical engineer in 1928. From 1940 until 1944 on loan from the CPR as president and general manager of Federal Aircraft Limited, and then for a year was in charge of entire aircraft industry as aircraft controller, Department of Munitions and Supply. In 1945 became manager of CPR department of research which he organized following the war. Appointed chief of motive power and rolling stock in 1945.

Clubs and associations: Member Engineering Institute of Canada and Fellow, A.S.M.E., on a joint committee of which associations he worked to bring about co-operation in international activities. Past president of the Canadian Railway Club; member of engineering committee for industrialization of atomic energy with National Research Council, and a member of the board of Engineers Foundation in the United States. Awarded O.B.E. in King's Honours List in 1943 and C.B.E. in 1946 for his part in Canada's wartime production effort.

W. A. Newman